Request No. DOER 1-37 (Electric):

Please refer to Schedule KMA-3 (Electric). This schedule identifies the Marginal Cost customer and volumetric components for each rate class. For the last three Company rate cases, please submit the Company's estimated Marginal Cost customer and volumetric components for each rate class.

Response:

For FG&E's Electric Division, the last three rate cases were; D.P.U. 90-122 (Rate Design Case) (filed on May 17, 1990, D.P.U. 84-145 (filed on July 16, 1984), and D.P.U. 1270/1414 (1982).

For D.P.U. 90-122, the marginal cost customer and volumetric components are provided in Attachment DOER 1-37 (Electric), pages 1 through 10.

For D.P.U. 84-145, FG&E did not file a marginal cost study. However, FG&E did review and consider information regarding the Company's marginal costs. That information is provided in Attachment DOER 1-37 (Electric), page 11. In response to a request from the Department, FG&E submitted a marginal cost study. That study is provided in Attachment DOER 1-37 (Electric), pages 12 through 77. Note that due to the age of these records, some portions are illegible.

FG&E has no records available pertaining to D.P.U. 1270/1414.

In the Department's Investigation of FG&E's Electric Distribution Rates (D.T.E. 99-118), FG&E was directed to allocate the revenue decrease to its rate classes by means of an equal percentage decrease to its distribution base rates. This proceeding culminated in an across-the-board rate change and did not include an analysis of the design of rates, nor was a marginal costs study performed.

Person Responsible: Karen M. Asbury

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

Schedule 1
(page 1 of 2)

RESIDENTIAL RATES R-1, R-2, AND R-4

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KWH BILLING UNITS		WEIGHTED RATES
PRODUCTION ($/KW)	$97.83	24,411	141,396,620		$0.01689
TRANSMISSION ($/KW)	$14.49	24,411	141,396,620		$0.00250
DISTRIBUTION-PRI. ($/KW)	$52.81	34,852	141,396,620		$0.01302
DISTRIBUTION-SEC. ($/KW)	$33.00	34,852	141,396,620		$0.00813
					$0.04054
ENERGY ($/KWH)					
ON PEAK	$0.05459		67,383,654	47.66%	$0.02602
OFF PEAK	$0.03093		74,012,966	52.34%	$0.01619
			141,396,620	100.00%	$0.04221
CUSTOMER ($/MONTH) (R-1)	$14.82				

(1) RATE DESIGN - RATE R-1	R-1 BILLING UNITS	RATES	REVENUES
CUSTOMER	244,644	$12.73	$3,114,318
DEMAND ($/KWH)		$0.04054	
ENERGY($/KWH)		$0.04221	
TOTAL		$0.08275	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	123,629,677	$0.04768	$5,894,663
		CALCULATED REVENUE	$9,008,981
		ALLOCATED REVENUE	$9,008,353
		DIFFERENCE	$628

(2) RATE DESIGN - RATE R-1	R-1 BILLING UNITS	RATES	REVENUES
CUSTOMER	244,644	$6.00	$1,467,864
DEMAND ($/KWH)		$0.04054	
ENERGY ($/KWH)		$0.04221	
TOTAL		$0.08275	
RECONCILIATION ADJUSTMENT ($/KWH)		0.01336	
TOTAL		$0.09611	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	123,629,677	$0.06104	$7,546,355
		CALCULATED REVENUE	$9,014,219
		PLUS MULTI-UNIT CHARGE @ $16.50	$6,138
		ALLOCATED REVENUE	$9,008,353
		PLUS T-O-U ADJUSTMENT	$966
		DIFFERENCE	$11,038

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES
(continued)

(3) RATE DESIGN - RATE R-2	R-2 BILLING UNITS	RATES	REVENUES
CUSTOMER	24,120	$3.60	$86,832
TOTAL ENERGY CHARGE ($/KWH)	7,807,614	$0.03662	$285,915
		CALCULATED REVENUE	$372,747
		ALLOCATED REVENUE	$383,532
			($10,785)
		R-1 + R-2 CALC. REVENUE	$9,393,104
		R-1 + R-2 ALLOC. REVENUE	$9,392,851
			$253

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) R-1 CUSTOMER CHARGE SET THEN R-1 PLUS R-2 REVENUE RECONCILED ON $/KWH BASIS.
(3) R-2 RATES SET AT 60% OF R-1.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

RESIDENTIAL RATES R-1, R-2, AND R-4

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KWH BILLING UNITS ON PEAK	WEIGHTED RATES
PRODUCTION ($/KW)	$97.83	24,411	67,383,654	$0.03544
TRANSMISSION ($/KW)	$14.49	24,411	67,383,654	$0.00525
DISTRIBUTION-PRI. ($/KW)	$52.81	34,852	67,383,654	$0.02731
DISTRIBUTION-SEC. ($/KW)	$33.00	34,852	67,383,654	$0.01707
				$0.08507
ENERGY ($/KWH)				
ON PEAK	$0.05459			
OFF PEAK	$0.03093			
CUSTOMER ($/MONTH) (R-4)	$25.67			

****

(1) RATE DESIGN - RATE R-4	R-1 AND R-4 BILLING UNITS	RATES	REVENUES
CUSTOMER	244,704	$13.14	$3,215,411
DEMAND - ALL ON PEAK ($/KWH)		$0.08507	
ENERGY - ON PEAK ($/KWH)		$0.05459	
TOTAL		$0.13966	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ON PEAK ENERGY CHRG ($/KWH)	58,028,749	$0.10460	$6,069,807
ENERGY - OFF PEAK ($/KWH)		$0.03093	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	65,673,552	($0.00413)	($271,232)
		CALCULATED REVENUE	$9,013,986
		ALLOCATED REVENUE	$9,013,645
		DIFFERENCE	$341

(2) RATE DESIGN - RATE R-4	R-1 AND R-4 BILLING UNITS	RATES	REVENUES
CUSTOMER	244,644	$6.00	$1,467,864
DEMAND - ALL ON PEAK ($/KWH)		$0.08507	
ENERGY - ON PEAK ($/KWH)		$0.05459	
TOTAL - ON PEAK		$0.13966	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.01412	
TOTAL - ON PEAK		$0.15378	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ON PEAK ENERGY CHRG ($/KWH)	58,028,749	$0.11872	$6,889,173
ENERGY - OFF PEAK ($/KWH)		$0.03093	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.01412	
TOTAL - OFF PEAK		$0.04505	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	65,673,552	$0.00999	$656,079
		CALCULATED REVENUE	$9,013,116
		ALLOCATED REVENUE	$9,013,645
		DIFFERENCE	($529)

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES
(continued)

(3) RATE DESIGN - RATE R-4	R-4 BILLING UNITS	RATES	REVENUES
CUSTOMER	60	$6.00	$360
TOTAL ON PEAK ENERGY CHRG ($/KWH)	24,285	$0.11872	$2,883
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	48,339	$0.00999	$483
		CALCULATED REVENUE	$3,726
		PLUS METER CHARGE @ $10.00	$600
		TARGET	$5,292
		DIFFERENCE	($966)

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) CUSTOMER CHARGE SET THEN REVENUE RECONCILED ON $/KWH BASIS.
(3) REVENUE PROOF USING TEST YEAR R-4 BILLING DETERMINANTS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

COMMERCIAL RATE G1

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KWH BILLING UNITS		WEIGHTED RATES
PRODUCTION ($/KW)	$97.83	712	4,023,692		$0.01731
TRANSMISSION ($/KW)	$14.49	712	4,023,692		$0.00256
DISTRIBUTION-PRI. ($/KW)	$52.81	895	4,023,692		$0.01175
DISTRIBUTION-SEC. ($/KW)	$33.00	895	4,023,692		$0.00734
					$0.03896
ENERGY ($/KWH)					
ON PEAK	$0.05459		2,388,371	59.36%	$0.03240
OFF PEAK	$0.03093		1,635,321	40.64%	$0.01257
			4,023,692	100.00%	$0.04497
CUSTOMER ($/MONTH)	$15.79				

(1) RATE DESIGN - RATE G-1	G-1 BILLING UNITS		RATES	REVENUES
CUSTOMER	12,720		$18.46	$234,811
DEMAND ($/KWH)			$0.03896	
ENERGY($/KWH)			$0.04497	
TOTAL			$0.08394	
LESS FUEL CHARGE ($/KWH)			$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	3,729,277		$0.04887	$182,250
		CALCULATED REVENUE		$417,061
		ALLOCATED REVENUE		$417,057
		DIFFERENCE		$4

(2) RATE DESIGN - RATE G-1	G-1 BILLING UNITS		RATES	REVENUES
CUSTOMER	11,084		$15.74	$174,462
FIXED DEMAND CUSTOMERS	1,636		$10.00	$16,360
DEMAND ($/KWH)			$0.03896	
ENERGY($/KWH)			$0.04497	
TOTAL			$0.08394	
RECONCILIATION ADJUSTMENT ($/KWH)			$0.01180	
TOTAL			$0.09574	
LESS FUEL CHARGE ($/KWH)			$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	3,729,277		$0.06067	$226,255
		CALCULATED REVENUE		$417,077
		ALLOCATED REVENUE		$417,057
		DIFFERENCE		$20

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) CUSTOMER CHARGE SET THEN REVENUE RECONCILED ON $/KWH BASIS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

COMMERCIAL RATES G-2

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KW BILLING UNITS		WEIGHTED RATES
PRODUCTION ($/KW)	$94.52	20,796	462,936		$4.25
TRANSMISSION ($/KW)	$14.00	20,796	462,936		$0.63
DISTRIBUTION-PRI. ($/KW)	$42.64	21,063	462,936		$1.94
DISTRIBUTION-SEC. ($/KW)	$19.65	15,314	462,936		$0.65
					$7.47
ENERGY ($/KWH)					
ON PEAK	$0.05456		67,926,454	59.36%	$0.03239
OFF PEAK	$0.03093		46,509,319	40.64%	$0.01257
			114,435,773	100.00%	$0.04496
CUSTOMER ($/MONTH)	$33.83				

****

(1) RATE DESIGN - RATE G-2	G-2 BILLING UNITS	RATES	REVENUE
CUSTOMER	19,896	$112.82	$2,244,667
DEMAND ($/KW)	428,837	$7.47	$3,203,412
ENERGY($/KWH)		$0.04496	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	105,834,032	$0.00989	$1,046,699
		CALCULATED REVENUE	$6,494,778
		ALLOCATED REVENUE	$6,494,736
		DIFFERENCE	$42

(2) RATE DESIGN - RATE G-2	G-2 BILLING UNITS	RATES	REVENUE
CUSTOMER	19,896	$35.00	$696,360
DEMAND ($/KW)	428,837	$9.28	$3,979,607
ENERGY ($/KWH)		$0.04496	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.00741	
		$0.05237	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	105,834,032	$0.01730	$1,830,929
		CALCULATED REVENUE	$6,506,896
		ALLOCATED REVENUE	$6,494,736
		PLUS TOU ADJUSTMENT	$12,614
		DIFFERENCE	($454)

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) CUSTOMER CHARGE SET THEN REVENUE RECONCILED ON HALF ENERGY-HALF DEMAND.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

INDUSTRIAL RATE G-3

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KVA BILLING UNITS	WEIGHTED RATES
PRODUCTION ($/KW)	$87.18	20,776	391,106	$4.63
TRANSMISSION ($/KW)	$12.91	20,776	391,106	$0.69
DISTRIBUTION-PRI. ($/KW)	$20.27	10,800	391,106	$0.56
DISTRIBUTION-SEC. ($/KW)	$0.00	0	391,106	$0.00
				$5.88
ENERGY ($/KWH)				
ON PEAK	$0.05188			
OFF PEAK	$0.03057			
CUSTOMER ($/MONTH)	$205.67			

****

(1) RATE DESIGN - RATE G-3	G-3 BILLING UNITS	RATES	REVENUES
CUSTOMER	348	$5,693.44	$1,981,317
DEMAND ($/KVA)	374,100	$5.88	$2,199,708
ON PEAK ENERGY($/KWH)		$0.05188	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ON PEAK ENERGY CHRG ($/KWH)	68,723,630	$0.01682	$1,155,931
OFF PEAK ENERGY($/KWH)		$0.03057	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	58,424,622	($0.00449)	($262,327)
		CALCULATED REVENUE	$5,074,630
		ALLOCATED REVENUE	$5,074,631
		DIFFERENCE	($1)

(2) RATE DESIGN - RATE G-3	G-3 BILLING UNITS	RATES	REVENUES
CUSTOMER	348	$300.00	$104,400
DEMAND ($/KVA)	374,100	$8.39	$3,138,699
ON PEAK ENERGY($/KWH)		$0.05188	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.00738	
TOTAL		$0.05926	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ON PEAK ENERGY CHRG ($/KWH)	68,723,630	$0.02420	$1,663,112
OFF PEAK ENERGY($/KWH)		$0.03057	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.00738	
TOTAL		$0.03795	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	58,424,622	$0.00289	$168,847
		CALCULATED REVENUE	$5,075,058
		ALLOCATED REVENUE	$5,074,631
		DIFFERENCE	$427

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) CUSTOMER CHARGE SET THEN REVENUE RECONCILED ON HALF DEMAND-HALF ENERGY.

7

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

COMMERCIAL RATES G-2 AND G-4

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KW BILLING UNITS ON PEAK	WEIGHTED RATES
PRODUCTION ($/KW)	$94.52	20,856	384,410	$5.13
TRANSMISSION ($/KW)	$14.00	20,856	384,410	$0.76
DISTRIBUTION-PRI. ($/KW)	$42.64	21,123	384,410	$2.34
DISTRIBUTION-SEC. ($/KW)	$19.65	15,358	384,410	$0.79
				$9.02
ENERGY ($/KWH)				
ON PEAK	$0.05456			
OFF PEAK	$0.03093			
CUSTOMER ($/MONTH) (G-4)	$37.03			

****

(1) RATE DESIGN - RATE G-4	G-2 AND G-4 BILLING UNITS	RATES	REVENUES
CUSTOMER	19,908	$115.98	$2,308,930
ON PEAK DEMAND ($/KW)	351,923	$9.02	$3,172,866
ON PEAK ENERGY($/KWH)		$0.05456	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ON PEAK ENERGY CHRG ($/KWH)	62,207,208	$0.01950	$1,213,041
OFF PEAK ENERGY($/KWH)		$0.03093	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	43,930,324	($0.00413)	($181,432)
		CALCULATED REVENUE	$6,513,404
		ALLOCATED REVENUE	$6,513,361
		DIFFERENCE	$43

(2) RATE DESIGN - RATE G-4	G-2 AND G-4 BILLING UNITS	RATES	REVENUES
CUSTOMER	19,908	$35.00	$696,780
ON PEAK DEMAND ($/KW)	351,923	$11.31	$3,980,249
ON PEAK ENERGY($/KWH)		$0.05456	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.00758	
TOTAL		$0.06214	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ON PEAK ENERGY CHRG ($/KWH)	62,207,208	$0.02708	$1,684,571
OFF PEAK ENERGY($/KWH)		$0.03093	
RECONCILIATION ADJUSTMENT ($/KWH)		$0.00758	
TOTAL		$0.03851	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	43,930,324	$0.00345	$151,560
		CALCULATED REVENUE	$6,513,159
		ALLOCATED REVENUE	$6,513,361
		DIFFERENCE	($202)

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES
(continued)

(3) RATE DESIGN - RATE G-4	G-4 BILLING UNITS	RATES	REVENUES
CUSTOMER	12	$35.00	$420
ON PEAK DEMAND ($/KW)	366	$11.31	$4,139
TOTAL ON PEAK ENERGY CHRG ($/KWH)	15,084	$0.02708	$408
TOTAL OFF PEAK ENERGY CHRG ($/KWH)	288,416	$0.00345	$995
		CALCULATED REVENUE	$5,963
		PLUS METER CHARGE @ $4.00	$48
		ALLOCATED REVENUE	$18,625
		DIFFERENCE	($12,614)

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) CUSTOMER CHARGE SET THEN REVENUE RECONCILED ON HALF DEMAND-HALF ENERGY.
(3) REVENUE PROOF USING TEST YEAR G-4 BILLING DETERMINANTS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DEVELOPMENT OF MARGINAL COST BASED RATES

Schedule 7
(page 1 of 1)

COMMERCIAL RATES G-2 AND G-5

COST COMPONENT	MARGINAL COSTS	CLASS CP OR NCP	KWH BILLING UNITS		WEIGHTED RATES
PRODUCTION ($/KW)	$94.52	21,027	115,701,495		$0.01718
TRANSMISSION ($/KW)	$14.00	21,027	115,701,495		$0.00254
DISTRIBUTION-PRI. ($/KW)	$42.64	21,297	115,701,495		$0.00785
DISTRIBUTION-SEC. ($/KW)	$19.65	15,484	115,701,495		$0.00263
					$0.03020
ENERGY ($/KWH)					
ON PEAK	$0.05456		68,677,758	59.36%	$0.03239
OFF PEAK	$0.03093		47,023,737	40.64%	$0.01257
			115,701,495	100.00%	$0.04496

****

(1) RATE DESIGN - RATE G-5	G-5 BILLING UNITS	RATES	REVENUES
CUSTOMER	420	$59.53	$25,003
DEMAND ($/KWH)		$0.03020	
ENERGY($/KWH)		$0.04496	
TOTAL		$0.07516	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	1,175,011	$0.04009	$47,106
	CALCULATED REVENUE		$72,109
	ALLOCATED REVENUE		$72,107
	DIFFERENCE		$2

(2) RATE DESIGN - RATE G-5	G-5 BILLING UNITS	RATES	REVENUES
CUSTOMER	420	$3.27	$1,373
DEMAND ($/KWH)		$0.03020	
ENERGY($/KWH)		$0.04496	
TOTAL		$0.07516	
RECONCILIATION ADJUSTMENT ($/KWH)		0.02011	
TOTAL		$0.09527	
LESS FUEL CHARGE ($/KWH)		$0.03506	
TOTAL ENERGY CHARGE ($/KWH)	1,175,011	$0.06020	$70,736
	CALCULATED REVENUE		$72,109
	ALLOCATED REVENUE		$72,107
	DIFFERENCE		$2

(1) REVENUE RECONCILED ON THE CUSTOMER CHARGE.
(2) CUSTOMER CHARGE SET THEN REVENUE RECONCILED ON $/KWH BASIS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
REVIEW OF MARGINAL COSTS

MARGINAL ENERGY COSTS BASED ON QUARTERLY CFA FILINGS

	AUG-OCT 1983	NOV-JAN 1983	FEB-APR 1984	MAY-JUL 1984
1. ESTIMATED QF RATE [1]	$0.04068	$0.04977	$0.05394	$0.05353
2. ESTIMATED FUEL COST RATE	$0.03921	$0.04741	$0.05266	$0.05275
3. DIFFERENCE	$0.00147	$0.00236	$0.00128	$0.00078

MARGINAL POWER SUPPLY CAPACITY COSTS AS ESTIMATED

4. ESTIMATED COST OF ACQUIRING NEW CAPACITY	$30.00 PER KW-YEAR
5. RESERVE MARGIN ALLOWANCE OF 20%	$6.00
6. TRANSMISSION LOSS ALLOWANCE OF 6%	$2.16
7. TRANSMISSION INVESTMENT ALLOWANCE OF 50%	$19.08
8. TOTAL ESTIMATED POWER SUPPLY CAPACITY COST	$57.24 PER KW-YEAR
9. CAPACITY COST PER MONTH	$4.77 PER KW-MONTH
10. PRESENT COMMERCIAL/INDUSTRIAL DEMAND CHARGES	$3.96 PER KW-MONTH

NOTES:

[1] VALUES PRESENTED ARE THE ESTINATED AVOIDED COST RATES FOR QUALIFYING FACILITIES AT THE SECONDARY DISTRIBUTION LEVEL.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DPU 84-145
RESPONSE TO THIRD SET OF DPU REQUESTS

Responsible Witness: George R. Gantz

DPU-3-1-4

1. Please provide a calculation of the Company's marginal capacity costs by voltage levels and daily and seasonal time periods according to the modified peaker method approved in Boston Edison Company, D.P.U. 1720 (1984). (See pp. 156-160).

2. Provide a calculation of marginal transmission and distribution costs by voltage level and daily and seasonal time periods according to the method approved in the same Order, with the appropriate statistical justification for the historical and projected relationship between a change in peak load and transmission (or distribution) investment used to determine the costs of an additional KW of demand on the transmission and distribution systems. (See pp. 160-164).

3. Please provide a calculation of marginal customer costs according to the method approved in D.P.U. 1720. (See pp. 163-173).

4. Provide marginal cost-based rates in conformance with the methodology set in D.P.U. 1720. (See pp. 118, 155, 166-173).

Supplmental Response

See attached.

Date: November 16, 1984

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
TABLE OF CONTENTS

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
SECTION I: DESCRIPTION

A. Introduction
B. Generation
C. Transmission
D. Distribution and Customer
E. Conclusions

A. Introduction

The accompanying study reflects the Company's best efforts to respond to the Massachusetts Department of Public Utilities' request for a marginal cost study conforming with the methodology set forth in the Department's recent rate order for Boston Edison Company (D.P.U. 1720). Certain problems were encountered that prevented us from duplicating precisely the study performed by Boston Edison. However, we believe the study satisfies the general principles set forth by the Department in D.P.U. 1720 and provides the best estimates presently available of the Company's marginal costs. The Company does not believe, however, that this study should be the sole determinant for designing cost-based rates. More specifically, the Company believes that the study generally supports the rate design recommendations made by the Company in their original filing, but that the marginal cost study itself shows such a dramatic result that it should not be used in designing rates in the manner prescribed by the Department in D.P.U. 1720. This recommendation is explained in greater detail in the concluding section below.

The study is organized in a manner intended to facilitate review. Section I of the study is this description. Section II contains the schedules demonstrating the actual marginal cost calculations and results. In particular, Schedules 1, 1A, 1B, and 1C show the development of marginal demand costs including Generation, Transmission and Distribution Capacity costs. Schedule 2 shows the development of marginal energy costs and Schedules 3, 3a, and 3b show the development of marginal customer costs. Schedules 4,5, and 6 then show the comparison of marginal costs with the revenue requirement, the calculation of marginal costs constrained to that requirement, and the development of demonstration marginal cost-based rates, respectively.

Section III contains all of the workpapers for the specific numbers utilized in all of the schedules, including investments, expenses, loaders, carrying charges, and miscellaneous. Section IV contains the few external workpapers that we felt were required to allow a comprehensive review of the study without need for extensive discovery.

B. GENERATION COSTS

Generation costs have been estimated using the modified peaker methodology established by the Department in D.P.U. 1720. The current cost of a peaker is escalated to the future point in time that capacity will be needed for the utility, then the resulting value is discounted to current year dollars. In the case of Fitchburg, although capacity will be needed by 1986, that need is expected to be satisfied through purchases of capacity from existing facilities that have significantly lower operating costs than a peaker. The pure capacity cost of such plants is less than the cost of a peaker. Hence, for the 1986 time period, peaker costs would overstate the generation capacity costs to be experienced by the Company.

We expect our needs for capacity to be met with existing, lower-operating cost units through the 1980's. At the point in time in New England when such units are no longer available, then one or more utilities in New England will have to build new capacity just to meet reliability needs. At that point in time, the marginal capacity cost of generation may well be the cost of a peaker. Since Boston Edison in D.P.U. 1720 has estimated 1991 as the year in which new capacity will be required for their system, we have also used 1991.

Once the marginal generation capacity investment is determined, allowances are added for reserve margin, general plant, and plant related administrative and general expense. The resulting total investment is multiplied times a levelized carrying charge which measures the first year economic cost of the present value of the total revenue requirements associated with the investment. The annual carrying costs in current dollars are then added to estimates of operating and maintenance expense and non-plant related administrative and general expense to yield total estimated marginal cost for generation capacity. This cost must then be adjusted for losses on the transmission and distribution system.

In addition to marginal generation capacity costs, estimates must be made of marginal generation energy costs. Such estimates have been provided to the D.P.U. by the Company, as part of the Company's quarterly Fuel Charge Adjustment filings, for the purpose of establishing rates for Qualifying Facilities. We have used the estimated QF rates for each of the twelve months in 1984 as a basis for our marginal energy cost estimates in this study. The raw QF rates are first weighted by monthly generation to yield an annual weighted average rate for on-peak, off-peak, and total periods. To these rates we have added an allowance for working capital and an allowance for transmission expense. The working capital allowance reflects the carrying costs for Materials and Supplies (inventory) and for Working Cash Requirements. The transmission expense adder reflects the fact that the Company must pay other utilities for the transmission of both on-peak and off-peak marginal energy from the generation source to the Company's system. These adders are appropriate for calculation of marginal costs, but should be excluded, as they are presently, from calculation of avoided costs, because such costs are not avoidable over the short term. The resulting costs are then adjusted appropriately for transmission and distribution losses.

C. TRANSMISSION

The Company presently does not have available an accurate forecast of the costs of future transmission investment required to meet increases in peak loads. We have therefore relied exclusively on historical data as the basis for estimating marginal costs. The Company's plant accounting data for the period from 1974 through 1984 shows the original cost of all plant additions and retirements by year. Data for 1984 is based on actual results through September and on a review of outstanding work orders for the remainder of the year. These costs have been escalated on an account by account basis to 1984 using the Handy-Whitman index of Electric Utility Costs for the North Atlantic Region. We have assumed that all retirements had service lives equal to the current average depreciable life for that plant account. The resulting total net investment in 1984 dollars is divided by the increase in average monthly peak loads from 1974 to 1984 to yield an estimated investment per kilowatt of increased demand. Allowances for general plant and for plant related A&G expense are added to the net investment. Annual carrying costs and expenses are then calculated in a manner identical to that described above for generation capacity. The resulting value is also adjusted for losses to yield the estimated marginal cost of transmission capacity.

D. DISTRIBUTION AND CUSTOMER

The procedure for estimating the marginal cost of distribution capacity is similar to the process described above for transmission. Net investment costs per kilowatt are calculated from data for 1974 through 1984 for Accounts 360-362, Accounts 364-365, Accounts 366-367, and Account 368. One adjustment to the distribution plant data was made due to the fact that a very large retirement of distribution plant took place in 1981, when the Company's No. 6 Generating Station was retired. That distribution retirement was a retirement of subtransmission equipment, the need for which was obviated by the investments in new Transmission facilities made by the Company in 1973 and earlier. That retirement therefore had to be removed from the 1981 Distribution retirements in order to properly reflect net distribution investments in 1981. Accounts 364-365 and 366-367 are split to Primary and Secondary on the same basis as the Company's original Cost Of Service Study in Exhibit GRG-6.

Allowances for general plant and for the plant related portion of A&G expense are added to net investment per unit. Carrying charges, O&M expenses and the remaining A&G expenses are then summed to yield total annual costs per kilowatt of demand. In the case of distribution capacity, the measure of demand is non-coincident peak demand rather than system coincident peak demand. The several components of distribution capacity are then aggregated into Primary and Secondary categories. No loss factor is applied.

The remaining components of distribution plant are the customer related components and include services, meters and street lighting equipment. The marginal cost of these components have been estimated in a very similar manner to the other components of distribution plant, however the estimate of net investment cost per unit is derived from current cost information rather than historical data. Current installed costs for services, meters and street lighting equipment of various types have been obtained and/or estimated from engineering and purchasing information. The general plant and plant related A&G adders are applied, and then carrying costs and O&M expenses calculated to yield total marginal distribution customer costs.

The only additional customer related costs are the costs of customer accounting and customer service activities. These costs are calculated in the same manner as all other expenses and added to the other components of customer costs to give total marginal customer costs.

E. CONCLUSIONS

The marginal cost study filed demonstrates that marginal costs for the Company are below the revenue requirement requested by the Company in this case by over $9 Million. This result is primarily due to the fact that the Company's marginal energy costs are not significantly different from the Company's average fuel costs. Such a result can be expected for most utilities that rely in whole or in part on very large energy purchases from single facilities or systems. In such cases, the cost of additional energy purchases are generally based on the average costs of the selling utility and not on the marginal costs.

The Company believes that caution must be used in interpreting and utilizing the results of the Marginal Cost Study for purposes of rate design. In particular, extreme care must be used in performing an incremental cost analysis such as that required for transmission and distribution capacity cost. A uniform, systematic correlation between investments and load will simply not exist due to the "lumpy" nature of such investments, to the differing time horizons for various construction activities, to the inaccuracies and lags in the planning process relative to actual experience, and to inherent deficiencies in the data set and methods of analysis required to develop the actual cost of additions net of retirements in current dollars. In addition, results which may appear on the surface to be incorrect may actually signal real changes in cost structure. For example, the net negative ten-year investment in distribution structures and station equipment (Accounts 360-362) is probably the result of the gradual evolution of the Company's system towards higher voltage and more economical primary distribution circuits. The Company believes that the incremental investment analysis presented here is reasonable, but very sensitive to future changes in investment patterns and loads.

More specific problems are encountered when actually using the results of the Company's Marginal Cost Study for rate design. For example, utilizing the results of the Marginal Cost Study to design rates strictly in accordance with the approach developed by the Department in D.P.U. 1720 would result in extremely high customer charges of $16.61, $146.62 and $18,000.88 per month for residential, commercial and industrial customers, respectively, a result which neither the Company nor the intervenors would recommend. If the reconciling of marginal cost rates to class revenues were accomplished on the demand portion of costs instead of the customer portion, the resulting demands charges would also be extremely high, roughly $15 for both E-GS1 and E-GS2 customers. Reconciling marginal costs to class revenues while satisfying the Rate Continuity objective is a significant problem given the marginal cost results.

However, the results of the marginal cost study do confirm certain general observations made by the Company in the original filing. In particular, the marginal costs are less than the revenue requirement, and marginal energy costs are almost equal to the Company's average fuel costs. The economic efficiency objective would therefore suggest that energy charges should be increased modestly, if at all. Second, the study shows unconstrained marginal customer costs to be significantly higher than current customer charges, namely $7.81, $19.58, and $159.81 respectively for residential, commercial and industrial customers. The Company does not recommend setting customer charges at the marginal customer cost level, due primarily to the need for Rate Continuity. However, the results do show that the Company's proposed customer charges are quite modest and reasonable. Finally, the marginal cost study shows that marginal demand related costs are significantly higher than present demand charges both for rate GS-2 and, more severely, for rate GS-1. The proposed demand charge of $6 would provide a reasonable balance between marginal cost results, marginal cost reconciliation, and Rate Continuity for both E-GS1 and E-GS2.

Based on a review of the marginal cost results, the Company recommends that the filed rate design proposals be adopted as reasonable steps towards marginal cost-based rate designs. The Company also offers to prepare, prior to its next rate case filing, a more detailed and comprehensive analysis of marginal cost-based rates on a class by class basis. That analysis would build upon the Marginal Cost Study presented here and would form the basis for the Company's rate design proposals in that rate case.

NOTE: In order to address concerns regarding the Company's demand allocators, we have rerun the marginal cost study utilizing the demand allocators derived from PSNH data, as shown in Exhibit HO-29. The marginal cost results appear to be relatively stable under changes in demand allocators, although some significant shifting of demand costs between classes does occur. The Company's conclusions based on this alternate scenario would be generally the same. The Marginal Cost Study Schedules corresponding to this sensitivity run are attached as Case B.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
SUMMARY OF DEMAND COSTS

SCHEDULE 1

A. TOTAL DEMAND COST BY VOLTAGE LEVEL	GENERATION	SUB-TRAN	PRIMARY	SECONDARY
COINCIDENT PEAK RELATED COSTS:				
1. MARGINAL DEMAND LOSS FACTOR [1]		8.863%	14.089%	15.211%
2. GENERATION COST [2]	$37.50	$40.83	$42.78	$43.20
3. TRANSMISSION COST [3]	$22.42	$24.42	$25.58	$25.84
4. TOTAL DEMAND COST PER KW CP	$59.92	$65.25	$68.37	$69.04
NON-COINCIDENT PEAK RELATED COSTS:				
5. DISTRIBUTION COST [4]	$0.00	$0.00	$21.82	$60.48
6. TOTAL DEMAND COST PER KW NCP	$0.00	$0.00	$21.82	$60.48

B. TOTAL DEMAND COST BY TIME PERIOD [5]		GENERATION	SUB-TRAN	PRIMARY	SECONDARY
1. CP DEMANDS ON PEAK	100%	$59.92	$65.25	$68.37	$69.04
OFF PEAK	0%	$0.00	$0.00	$0.00	$0.00
2. NCP DEMANDS ON PEAK	80%	$0.00	$0.00	$17.46	$48.38
OFF PEAK	20%	$0.00	$0.00	$4.36	$12.10

C. TOTAL DEMAND COST BY CLASS [6]:	RES	GS1	GS2	OL
PERCENT AT PRIMARY VOLTAGE	0.00%	25.64%	95.99%	0.00%
PERCENT AT SECONDARY VOLTAGE	100.00%	74.36%	4.01%	100.00%
1. COINCIDENT DEMAND COST PER KW CP	$69.04	$68.87	$68.35	$69.04
2. CLASS COINCIDENCE FACTOR	0.3292	0.6270	0.4564	0.4167
3. CP DEMAND COST ADJUSTED TO NCP DEMANDS	$22.73	$43.18	$31.22	$28.77
4. DEMAND COST PER KW NCP	$60.48	$50.57	$23.37	$60.48
5. TOTAL DEMAND COSTS PER KW NCP	$83.21	$93.75	$54.58	$89.25

NOTES:

[1] SEE WORKPAPER E-1. LOSSES APPLY TO CP COSTS ONLY, E.G. GENERATION AND TRANSMISSION.
[2] SEE SCHEDULE 1A
[3] SEE SCHEDULE 1B
[4] SEE SCHEDULE 1C
[5] SEE WORKPAPER E-2. COSTS BY TIME PERIOD ARE NOT USED FOR CALCULATING COSTS BY CLASS DUE TO THE LACK OF CLAS
[6] SEE WORKPAPER E-3 FOR DATA ON CLASS DEMANDS BY VOLTAGE LEVEL AND CLASS COINCIDENCE FACTORS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
MARGINAL COSTS OF GENERATION

SCHEDULE 1A

A. INVESTMENT COSTS

1. COST OF A PEAKER IN 1984 [1]		$320.02 /KW OF CAPACITY
2. INFLATE TO 1991 AT ESCALATION RATE [2] =	6.212%	487.98
3. DISCOUNT to 1984 AT RATE OF RETURN	15.57%	177.21
4. ADD 20% FOR RESERVE MARGIN	20.00%	35.44
5. NET INVESTMENT COST		$212.65 /KW ON SYSTEM PEAK
6. ADD LOADER FOR GENERAL PLANT [3]	2.13%	4.52
7. ADD LOADER FOR PLANT A&G [4]	1.21%	2.58
8. TOTAL INVESTMENT COST		$219.75 /KW OF SYSTEM PEAK

B. ANNUAL GENERATION COSTS

9. LEVELIZED CARRYING CHARGE RATE [5]	16.09%	
10. ANNUAL CARRYING CHARGES		$35.36
11. OPERATION AND MAINTENANCE EXPENSE [6]		$1.82
12. ADD NON-PLANT A&G [7]	17.70%	$0.32
13. TOTAL GENERATION CAPACITY COSTS		$37.50 /KW OF SYSTEM-PEAK [8]

NOTES:

[1] SEE WORKPAPER A-1.
[2] SEE WORKPAPER E-4. HANDY-WHITMAN ESCALATION FOR THE TWENTY YEAR PERIOD 1964-1984 HAS BEEN SELECTED AS THE MOST REPRESENTATIVE OF HISTORICAL, AND EXPECTED FUTURE ESCALATION RATES.
[3] SEE WORKPAPER C-1.
[4] SEE WORKPAPER C-2.
[5] SEE WORKPAPER D-1.
[6] SEE WORKPAPER A-1.
[7] SEE WORKPAPER C-3.
[8] SYSTEM PEAK DEMAND CAN BE DEFINED AS NEPOOL - DETERMINED CAPABILITY RESPONSIBILITY. CONTRIBUTION TO AVERAGE MONTHLY COINCIDENT PEAKS IS AN APPROPRIATE MEASURE OF CAPABILITY RESPONSIBILITY AND CAN THEREFORE BE USED TO ALLOCATE GENERATION CAPACITY COSTS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
MARGINAL COSTS OF TRANSMISSION

SCHEDULE 18

A. INVESTMENT COSTS

1.	NET INCR. INVEST. '74-'84 ($1984) [1]		$1,395,180
2.	INCREASE IN AVE. MONTHLY PEAKS '74-'84 [2]		10,187
3.	NET INVESTMENT COST		$136.96 /KW BASED ON AVERAGE MONTHLY SYSTEM PEAKS
4.	ADD LOADER FOR GENERAL PLANT [3]	2.13%	$2.91
5.	ADD LOADER FOR PLANT A&G [4]	1.21%	1.66
6.	TOTAL INVESTMENT COST		$141.54 /KW AVE. MO. PEAK

B. ANNUAL TRANSMISSION COSTS

7.	LEVELIZED CARRYING CHARGE RATE [5]	14.55%	
6.	ANNUAL CARRYING CHARGES		19.93
7.	OPERATION AND MAINTENANCE EXPENSE [6]		2.33
8.	ADD NON-PLANT A&G [7]	7.08%	0.16
9.	TOTAL ANNUAL COSTS PER UNIT		$22.42 /KW AVE. MO. PEAK

NOTES:

[1] SEE WORKPAPER A-2
[2] SEE WORKPAPER A-2
[3] SEE WORKPAPER C-1
[4] SEE WORKPAPER C-2
[5] SEE WORKPAPER D-2
[6] SEE WORKPAPER B-1
[7] SEE WORKPAPER C-3

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
MARGINAL COST OF DISTRIBUTION

SCHEDULE 1C

A. INVESTMENT COSTS [1]

	ACCOUNTS 360-362	ACCOUNTS 364-365 PRIMARY	ACCOUNTS 364-365 SECONDARY	ACCOUNTS 366-367 PRIMARY	ACCOUNTS 366-367 SECONDARY	ACCOUNT 368
1. INCR. INVEST. '74-'84 [2]	($300,098)	$1,429,189	$1,429,189	$381,867	$381,867	$942,916
2. INCREASE IN PEAKS '74-'84 [3]	10,187	20,864	14,330	20,864	14,330	14,330
3. NET INVESTMENT COST/KW NCP	($29.46)	$68.50	$99.74	$18.30	$26.65	$65.80
4. ADD LOADER FOR GEN PLANT [4]	(0.63)	1.46	2.12	0.39	0.57	1.40
5. ADD LOADER FOR PLANT A&G [5]	(0.36)	0.83	1.21	0.22	0.32	0.80
6. TOTAL INVESTMENT COST	($30.44)	$70.79	$103.07	$18.91	$27.54	$68.00

B. ANNUAL DISTRIBUTION COSTS

7. LEVELIZED C. CHG RATE [6]	15.69%	14.62%	14.62%	14.62%	14.62%	19.06%
8. ANNUAL CARRYING CHARGES	($4.78)	$10.35	$15.07	$2.77	$4.03	$12.96
9. OPER. AND MAINT. EXPENSE [7]	$2.35	$2.73	$1.87	$2.73	$1.87	$0.07
10. ADD NON-PLANT A&G [8]	1.71	1.99	1.36	1.99	1.36	0.05
11. TOTAL ANNUAL COSTS/KW NCP	($0.72)	$15.06	$18.31	$7.48	$7.26	$13.09

NOTES:

[1] PRIMARY DISTRIBUTION INCLUDES ACCOUNT 360-362,AND PRIMARY PORTIONS OF ACCOUNT 364-365, AND ACCOUNTS 366-367
SECONDARY DISTRIBUTION INCLUDES SECONDARY PORTIONS OF ACCOUNTS 364-365, AND ACCOUNTS 366-367, AND ACCOUNT 3

[2] SEE WORKPAPER A-3

[3] SEE WORKPAPER A-3

[4] SEE WORKPAPER C-1. SAME % LOADER AS FOR TRANSMISSION AND GENERATION.

[5] SEE WORKPAPER C-2. SAME % LOADER AS FOR TRANSMISSION AND GENERATION.

[6] SEE WORKPAPER D-3

[7] SEE WORKPAPER B-1

[8] SEE WORKPAPER C-3. THE FACTOR IS 72.80% OF O&M EXPENSE.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
SUMMARY OF ENERGY COSTS

SCHEDULE 2

A. MARGINAL ENERGY COSTS FROM 1984 QF FILINGS:	ON-PEAK	OFF-PEAK	TOTAL	MWH OUTP
JANUARY	0.05176	0.04014	0.04431	32,
FEBRUARY	0.04975	0.04795	0.04860	29,
MARCH	0.04975	0.04795	0.04860	32,
APRIL	0.04975	0.04795	0.04860	30,
MAY	0.05098	0.04500	0.04711	29,
JUNE	0.05098	0.04500	0.04711	30,
JULY	0.05098	0.04500	0.04711	29,
AUGUST	0.05098	0.04428	0.04668	33,
SEPTEMBER	0.05098	0.04428	0.04668	32,
OCTOBER	0.05096	0.04428	0.04666	32,
NOVEMBER	0.05010	0.03866	0.04273	31,
DECEMBER	0.05010	0.03866	0.04273	34,
ANNUAL AVERAGE WEIGHTED BY MWH	0.05059	0.04401	0.04636	

B. ADJUSTMENT FOR WORKING CAPITAL, TRANSMISSION AND LOSSES

1. WORKING CAPTIAL ADDER [1]	1.05%		
2. ADDER FOR TRANSMISSION EXPENSE [1]	$0.00127	ON-PEAK	$0.00114 OFF-PEAK
3. AVE. TRANS. EXPENSE (WTD BY ON/OFF HRS)	$0.00119	TOTAL PERIOD	

	VOLTAGE:	PRIMARY	SECONDARY
1. ON-PEAK LOSSES [2]		0.09462	0.09772
2. OFF-PEAK LOSSES [2]		0.07855	0.08475
3. TOTAL LOSSES [2]		0.09980	0.10409
MARGINAL ENERGY COSTS PER KWH BY VOLTAGE: [3]			
4. ON-PEAK		$0.05736	$0.05752
5. OFF-PEAK		$0.04920	$0.04948
6. TOTAL		$0.05283	$0.05303

ANNUAL MARGINAL ENERGY COSTS BY CLASS: [4]	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHTING
PERCENT KWH AT PRIMARY	0.00%	10.05%	94.44%	0.00%
PERCENT KWH AT SECONDARY	100.00%	89.95%	5.56%	100.00%
7. CLASS CENTS/KWH	$0.05303	$0.05301	$0.05284	$0.05303

NOTES:
[1] FROM WORKPAPER C-5
[2] FROM WORKPAPER E-1
[3] AVERAGE WEIGHTED $/KWH ADJUSTED FOR WORKING CAPITAL, TRANSMISSION EXPENSE, AND LOSSES
[4] CLASS CONSUMPTION BY VOLTAGE LEVEL FROM WORKPAPER E-3

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
SUMMARY OF CUSTOMER COSTS

SCHEDULE 3

A. METERS AND SERVICES		STANDARD	1-PHASE	3-PHASE 200 AMP	3-PHASE 400 AMP	3-PHASE 1200+ AMP	PRIMARY METERING
NUMBER [1]:	RESIDENTIAL	19,822					
	COMMERCIAL		1,194	299	299	199	
	INDUSTRIAL						18
1. ANNUAL COST FOR METERS [2]		$348,312	$72,268	$49,538	$88,586	$78,873	$33,703
2. ANNUAL COST FOR SERVICES [2]		641,633	35,514	16,076	21,851	14,567	0
3. TOTAL		$989,945	$107,782	$65,615	$110,437	$93,440	$33,703

	TOTAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHT
NUMBER OF CUSTOMERS [1]	22,977	20,477	1,990	18	492
4. TOTAL ANNUAL COST		$989,945	$377,273	$33,703	$0
5. TOTAL ANNUAL COST PER CUSTOMER		$48.34	$189.58	$1,872.39	$0

B. STREET LIGHTING	50W HPS	100W HPS	200W HPS	400W HPS	1000W HPS	100W MV	175W MV	400W MV	1000W MV
NUMBER BY TYPE [3]	1790	474	274	225	42	1009	357	381	42
1. ANNUAL COST BY TYPE [4]	$66.54	$68.74	$74.86	$91.45	$119.83	$62.98	$63.80	$81.21	$100.97
2. TOTAL ANNUAL COST BY TYPE	$119,104	$32,582	$20,511	$20,577	$5,033	$63,548	$22,778	$30,940.98	$4,240.88
3. TOTAL ANNUAL COST	$319,314	EQUALS	$649.01	PER STREET LIGHTING CUSTOMER					

C. OTHER CUSTOMER EXPENSES	TOTAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHT
NUMBER OF CUSTOMERS	22,977	20,477	1,990	18	492
1. COST PER CUSTOMER [4]		$45.35	$45.35	$45.35	$45.35

D. TOTAL CUSTOMER COSTS

1. TOTAL CUSTOMER COSTS/CUSTOMER	$93.69	$234.93	$1,917.74	$694.36

NOTES:
[1] SEE WORKPAPER E-3.
[2] SEE SCHEDULE 3A. $/UNIT VALUES MULTIPLIED BY NUMBER OF UNITS.
[3] FROM COMPANY BILLING RECORDS.
[4] SEE SCHEDULE 3-B.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
STREET LIGHTING AND OTHER CUSTOMER COSTS

SCHEDULE 3B

A. COST OF STREET LIGHTING		50W HPS	100W HPS	200W HPS	400W HPS	1000W HPS	100W MV	175W MV	400W MV	1000W MV
1. NET INVESTMENT COST: STREET LIGHTS [1]		$222.89	$236.24	$273.39	$374.15	$546.43	$201.30	$206.39	$311.36	$431.94
2. ADDER FOR GENERAL PLANT [2]	2.13%	4.74	5.02	5.81	7.95	11.62	4.28	4.39	6.63	9.18
3. ADDER FOR PLANT A&G [3]	1.21%	2.71	2.87	3.32	4.55	6.64	2.45	2.51	3.79	5.25
4. TOTAL INVESTMENT		$230.34	$244.14	$282.53	$386.65	$564.68	$208.03	$213.18	$322.38	$446.37
5. CARRYING CHARGES [4]	15.94%	$36.72	$38.92	$45.03	$61.63	$90.01	$33.16	$33.98	$51.39	$71.15
6. OPERATION AND MAINTENANCE [5]		17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26
7. ADDER FOR NON-PLANT A&G [6]	72.80%	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56
8. TOTAL ANNUAL COSTS		$66.54	$68.74	$74.86	$91.45	$119.83	$62.98	$63.80	$81.21	$100.97

B. OTHER CUSTOMER COSTS

1. CUSTOMER SERVICE AND ACCOUNTS [7] $45.35 PER CUSTOMER

NOTES:
[1] SEE WORKPAPER A-4.
[2] SEE WORKPAPER C-1.
[3] SEE WORKPAPER C-2.
[4] SEE WORKPAPER D-9.
[5] SEE WORKPAPER B-2.
[6] SEE WORKPAPER C-3.
[7] SEE WORKPAPER B-2.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
MARGINAL COSTS UNCONSTRAINED

SCHEDULE 4

	TOTAL COMPANY	RESIDENTIAL CLASS RATES E-R,SC,I	COMMERCIAL CLASS RATE E-GS1,CI	INDUSTRIAL CLASS RATE E-GS2	OUTDOOR LIGHTING CLASS RATE E-OL
A. CUSTOMER INFORMATION					
NO. CUSTOMERS	22,977	20,477	1,990	18	492
ANNUAL KWH SALES	349,098,014	107,485,886	91,658,312	146,385,359	3,368,457
NON-COINC. KW - DEMAND	125,191	57,872	34,468	31,981	870
B. MARGINAL COST SUMMARY [1]					
1. DEMAND COSTS	$9,869,863	$4,815,265	$3,231,280	$1,745,674	$77,644
2. ENERGY COSTS	18,483,356	5,700,302	4,859,021	7,734,786	189,246
3. CUSTOMER COSTS	2,762,217	1,918,554	467,518	34,519	341,626
4. TOTAL	$31,115,436	$12,434,122	$8,557,818	$9,514,979	$608,516
C. COMPARISON WITH REVENUE REQUIREMENT					
1. TOTAL MARGINAL COSTS	$31,115,436	$12,434,122	$8,557,818	$9,514,979	$608,516
2. TOTAL BASE RATES REQUESTED [2]	$22,414,431	$9,054,806	$6,864,966	$5,819,825	$674,834
3. FUEL RATE REVENUE 1984 [3]	18,002,346	5,542,851	4,726,852	7,548,825	184,019
4. TOTAL REVENUE REQUIREMENT	$40,416,777	$14,597,657	$11,591,818	$13,368,650	$858,853
5. DIFFERENCE	($9,301,342)	($2,163,535)	($3,033,799)	($3,853,671)	($250,337)

NOTES:
[1] VALUES FROM SCHEDULES 1,2 AND 3 MULTIPLIED TIMES VALUES IN SECTION A.
[2] FROM EXHIBIT GRG-9.
[3] FUEL RATE REVENUE IS CALCULATED ON THE BASIS OF 1984 FILED FUEL COST RATES, IN ORDER TO BE CONSISTENT WITH THE METHOD FOR ESTIMATING MARGINAL ENERGY COST. THE RESULTING 1984 AVERAGE ANNUAL FUEL RATE, EXCLUDING OVER AND UNDER RECOVERIES, IS $0.05157 PER KILOWATT HOUR. SEE WORKPAPER E-5.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
MARGINAL COSTS CONSTRAINED TO REVENUES

	TOTAL COMPANY	RESIDENTIAL CLASS RATES E-R,SC,I	COMMERCIAL CLASS RATE E-GS1,CT	INDUSTRIAL CLASS RATE E-GS2	OUTDOOR LIGHTING CLASS RATE E-OL
A. CUSTOMER INFORMATION					
NO. CUSTOMERS - PRIMARY	22977	20477	1990	18	492
ANNUAL KWH SALES	349,098,014	107,485,886	91,658,312	146,385,359	3,568,457
NON-COINC. KW - DEMAND	125,191	57,872	34,468	31,981	870
B. MARGINAL COST SUMMARY - CUSTOMER COSTS CONSTRAINED [1]					
1. DEMAND COSTS	9,869,863	4,815,265	3,231,280	1,745,674	77,644
2. ENERGY COSTS	18,483,356	5,700,302	4,859,021	7,734,786	189,246
3. CUSTOMER COSTS	12,063,558	4,082,089	3,501,317	3,888,190	591,962
4. TOTAL	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
C. COMPARISON WITH REVENUE REQUIREMENT					
1. TOTAL MARGINAL COSTS	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
2. TOTAL BASE RATES REQUESTED	$22,414,431	$9,054,806	$6,864,966	$5,819,825	$674,834
3. FUEL RATE REVENUE 1984	18,002,346	5,542,851	4,726,652	7,548,825	184,019
4. TOTAL REVENUE REQUIREMENT	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
5. DIFFERENCE	$0	$0	$0	$0	$0

NOTE:
[1] THE DIFFERENCE BETWEEN MARGINAL COSTS AND REVENUE REQUIREMENT BY CLASS ON SCHEDULE 4 IS SUBTRACTED FROM CUSTOMER COSTS FOR EACH CLASS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY — SCHEDULE 6
MARGINAL COST STUDY
DEMONSTRATION MARGINAL COST BASED RATES

	RESIDENTIAL CLASS RATES E-R,SC,I	COMMERCIAL CLASS RATE E-GS1,CI	INDUSTRIAL CLASS RATE E-GS2	OUTDOOR LIGHTING CLASS RATE E-OL
A. BILLING DETERMINANTS				
1. NO. OF CUSTOMERS	20,477	1,990	18	492
2. KWH SALES	107,485,886	91,658,312	146,385,359	3,568,457
3. KW OF DEMAND	-	34,468	31,981	-
B. MARGINAL COSTS AS CONSTRAINED				
4. CUSTOMER COSTS	$4,082,089	$3,501,317	$3,688,190	$591,962
5. ENERGY COSTS	$5,700,302	$4,859,021	$7,734,786	$189,246
6. LESS: FUEL REVENUES	$5,542,851	$4,726,652	$7,548,825	$184,019
7. NET ENERGY COSTS	$157,452	$132,369	$185,961	$5,227
8. DEMAND COSTS	$4,815,265	$3,231,280	$1,745,674	$77,644
C. MARGINAL COST BASED RATES				
9. CUSTOMER CHARGE PER MONTH	$16.61	$146.62	$18,000.88	$100.26
10. RESIDUAL ENERGY CHARGE PER KWH	$0.00146	$0.00144	$0.00127	$0.00146
11. NO-DEMAND RATE DEMAND CHARGE - PER KWH	$0.04480	-	-	$0.02176
12. TOTAL KWH CHARGE	$0.04626	$0.00144	$0.00127	$0.02322
13. DEMAND RATE DEMAND CHARGE - PER KW	-	$7.81	$4.55	-

FITCHBURG GAS AND ELECTRIC COMPANY
MARGINAL COST STUDY
INVESTMENT AND O&M COSTS FOR A PEAKER

WORKPAPER A-1

A. INVESTMENT

1. ESTIMATED PEAKER COST 1984 [1] $320.02 /KW OF CAPACITY

B. EXPENSES

	1983	1982	1981	1980	1979
1. O&M - PG&E GAS TURBINE [2]	$47.365	$42,898	$25,646	$43.175	$39,199
2. RATED CAPACITY - KW [3]	25,550	25,550	25,550	25,550	25,550
3. O&M PER KW	$1.85	$1.68	$1.00	$1.69	$1.53
4. ANNUAL INFLATION FACTOR [4]	1.0309	1.0626	1.1278	1.2447	1.4151
5. ANNUAL O&M - 1984 $	$1.91	$1.78	$1.13	$2.10	$2.17
6. AVERAGE O&M PER KW	$1.82				

NOTES:
[1] SAME VALUE AS THAT USED BY BOSTON EDISON IN DPU 1720
[2] ACCOUNTS 546,548.549,551,552,553,554 FROM FERC FORM 1 PAGE 321.
[3] FERC FORM 1 PAGE 421.
[4] BASED ON CPI - SEE WORKPAPER B-1.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
NET TRANSMISSION INVESTMENT

WORKPAPER A-2

A. TRANSMISSION NET OF ADDITIONS LESS RETIREMENTS IN 1984 $

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	TOTAL
350	23,461	9,118	17,488	(25,421)	(15,518)	9,706	0	0	2,244	(6,405)	356	15,029
352	0	0	0	0	0	0	0	1,640	0	0	0	1,640
353	20,723	151,114	(25,712)	32,914	1,075,823	207,549	(32,160)	(134,730)	13,294	125,934	4,483	1,439,032
354	0	0	(6,574)	437	1,210	0	(9,812)	0	0	0	0	(14,739)
355	711	3,063	(49,593)	20,539	24,450	30,930	5,120	(4,234)	(9,451)	1,032	625	23,172
356	3,930	5,503	(37,087)	7,219	22,802	33,883	(54,222)	(3,399)	(1,582)	304	441	(22,209)
357	0	0	0	0	0	0	0	0	0	0	0	0
358	(46,255)	0	0	0	0	0	(2,248)	0	0	0	0	(48,503)
359	0	0	1,758	0	0	0	0	0	0	0	0	1,758
SUBTOT	2,570	168,798	(99,720)	35,689	1,108,547	282,068	(93,323)	(140,724)	4,505	120,865	5,905	1,395,180

B. CHANGES IN MONTHLY SYSTEM PEAK LOADS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT [1]	NOV [1]	DEC [1]	TOTAL	AVERAGE
1974	60,300	56,500	54,900	55,000	52,300	54,300	53,400	54,600	55,400	52,000	54,900	54,700	658,300	54,858
1975	53,400	52,900	53,300	51,200	52,100	53,200	51,500	54,900	50,400	52,800	53,800	56,900	640,400	53,367
1976	60,310	57,480	55,280	53,780	52,890	55,980	51,890	56,590	54,880	55,590	56,360	61,280	672,310	56,026
1977	59,290	56,300	54,900	55,940	55,110	63,010	68,510	70,640	66,440	66,240	68,340	70,040	756,760	63,063
1978	69,190	67,090	68,480	68,340	67,050	68,240	68,890	75,330	67,200	65,580	68,450	69,530	823,370	68,614
1979	69,790	70,010	67,880	67,240	65,470	63,850	69,230	72,910	62,370	64,860	66,180	71,900	813,690	67,808
1980	68,520	67,140	65,830	65,580	63,380	62,290	65,460	66,720	67,480	63,060	63,280	66,800	786,540	65,545
1981	67,200	63,900	60,600	58,500	65,400	63,800	68,800	66,000	64,300	65,100	62,500	65,900	772,000	64,333
1982	70,800	65,700	65,900	62,500	57,500	59,000	61,700	61,000	56,300	55,600	58,600	63,200	737,800	61,483
1983	61,200	60,000	58,700	59,000	54,800	59,700	60,400	65,600	66,300	59,600	62,100	66,100	733,500	61,125
1984	65,800	63,500	64,000	59,000	62,100	70,900	64,300	68,300	62,700	63,412	66,266	70,263	780,541	65,045
'74-'84	5,500	7,000	9,100	4,000	9,800	16,600	10,900	13,700	7,300	11,412	11,366	15,563	122,241	10,187

NOTE: [1] DATA FOR 1984 ESTIMATED BY TAKING YEAR TO DATE 1984 OVER SAME PERIOD 1983 TIMES 1983 PEAK.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
TRANSMISSION ADDITIONS/RETIREMENTS

WORKPAPER A-2a

A. COST DATA

ADDITIONS

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
350	11,010	5,399	11,045	(16,613)	13,636	7,067	0	0	2,136	(5,781)	356
352	0	0	0	0	0	0	0	1,400	0	0	0
353	10,903	92,789	7,853	21,521	763,049	158,766	(15,049)	16,401	96,824	125,934	10,855
354	0	0	(4,075)	281	810	0	0	0	0	0	0
355	343	17,027	(1,513)	12,882	15,858	21,841	3,975	(373)	(8,705)	1,031	1,879
356	1,740	3,455	(3,779)	5,217	17,963	35,930	(3,523)	1,430	(1,460)	299	3,235
357	0	0	0	0	0	0	0	0	0	0	0
358	(6,485)	0	0	0	0	0	(1,719)	0	0	0	0
359	0	0	1,110	0	0	0	0	0	0	0	0

RETIREMENTS

350	0	0	0	0	3,563	0	0	0	0	60	0
352	0	0	0	0	0	0	0	0	0	0	0
353	409	268	5,828	0	0	0	2,315	24,221	12,810	0	1,062
354	0	0	0	0	0	0	666	0	0	0	0
355	0	1,731	3,514	0	0	0	0	465	0	3	176
356	8	58	2,245	0	156	1,475	4,376	476	1	0	270
357	0	0	0	0	0	0	0	0	0	0	0
358	1,500	0	0	0	0	0	0	0	0	0	0
359	0	0	0	0	0	0	0	0	0	0	0

B. PRESENT WORTH FACTORS:

ADDITIONS

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
350	2.1308	1.6889	1.5833	1.5302	1.4522	1.3735	1.2324	1.1232	1.0507	1.0133	1.0000
352	2.1308	1.6889	1.5833	1.5302	1.4522	1.3735	1.2324	1.1232	1.0507	1.0133	1.0000
353	2.1667	1.6479	1.5497	1.5294	1.4096	1.3073	1.2062	1.1250	1.0218	1.0000	1.0000
354	2.1250	1.6131	1.6131	1.5563	1.4933	1.3313	1.1882	1.0995	1.0780	1.0376	1.0000
355	2.0727	1.6286	1.6286	1.5944	1.5405	1.4161	1.2881	1.2000	1.0857	1.0224	1.0000
356	2.3107	1.8030	1.4969	1.3837	1.3678	1.4083	1.2461	1.0673	1.0721	1.0171	1.0000
357	2.1165	1.8632	1.7302	1.6391	1.5034	1.4156	1.2699	1.2179	1.0955	1.0332	1.0000
358	2.2174	1.7832	1.8889	1.9630	1.7466	1.6776	1.3077	1.0897	1.0494	1.0451	1.0000
359	2.1308	1.6889	1.5833	1.5302	1.4522	1.3735	1.2324	1.1232	1.0507	1.0133	1.0000

RETIREMENTS

											AVE. LIFE
350	11.4000	10.8571	10.3636	9.9130	9.9130	9.9130	9.5000	9.1200	9.1200	9.1200	40
352	9.9130	9.9130	9.9130	9.5000	9.1200	9.1200	9.1200	9.1200	8.7692	7.8621	6.7059	37
353	7.0909	6.8857	6.5000	6.5000	6.5000	6.3243	6.3243	6.3243	6.8857	6.8857	6.0000	38
354	13.8125	13.8125	13.8125	13.8125	15.7857	15.7857	14.7333	14.7333	13.8125	13.0000	13.0000	46
355	15.2000	14.2500	13.4118	12.6667	12.0000	10.3636	9.9130	8.1429	7.6000	7.3548	7.1250	34
356	11.3333	12.5263	14.0000	13.2222	11.3333	11.3333	10.8182	10.3478	10.8182	10.8182	10.3478	44
357	31.1429	27.2500	21.8000	19.5714	18.6250	12.3333	13.6250	14.3333	13.6250	13.6250	14.3333	59
358	21.2500	21.2500	23.1818	25.0000	23.1818	15.9375	14.1667	12.1429	11.5909	11.0870	14.1667	63
359	11.4000	11.4000	11.4000	11.4000	10.3636	11.4000	11.4000	12.0000	12.0000	11.4000	10.8571	50

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
NET DISTRIBUTION INVESTMENT

WORKPAPER A-3

A. DISTRIBUTION NET OF ADDITIONS LESS RETIREMENTS IN 1984 $

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	TOTAL
360	0	0	0	0	(3,433)	0	0	0	0	1,928	0	(1,505)
360.1	0	0	0	0	0	0	0	0	0	0	0	0
361	0	0	0	0	0	0	0	0	0	(20,316)	33,293	12,977
362	3,333	217,511	(3,049)	12,114	(161,841)	7,599	(33,693)	(19,508)	(790)	43,249	(376,496)	(311,570)
SUBTOT	3,333	217,511	(3,049)	12,114	(165,273)	7,599	(33,693)	(19,508)	(790)	24,861	(343,203)	(300,098)
364	287,072	140,061	36,330	123,895	30,201	(33,278)	133,389	44,302	120,073	124,555	43,481	1,070,222
365	324,260	400,675	166,005	179,987	146,189	553	171,581	79,540	125,866	166,685	21,014	1,782,155
366	157,690	55,331	13,441	10,487	67,863	29,591	1,967	5,969	1,912	(34,586)	(9,059)	300,606
367	112,476	29,800	35,322	52,309	55,350	33,230	65,562	2,230	12,945	19,647	44,256	463,128
SUBTOT	881,497	631,807	271,298	366,677	299,603	30,096	372,500	132,041	260,797	276,301	99,693	3,622,111
368	141,859	106,395	145,417	175,674	223,790	(90,887)	26,006	41,785	78,489	28,310	64,077	942,916
SUBTOT	141,859	106,395	145,417	175,674	223,790	(90,887)	26,006	41,785	78,489	28,310	64,077	942,916

B. CHANGES IN PEAK LOADS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1. SYSTEM PEAKS:														
74- 84	5,500	7,000	9,100	4,000	9,800	16,600	10,900	13,700	7,300	11,412	11,366	15,563	122,241	10,187

2. NON-COINCIDENT PEAKS:

AVE. SYSTEM PEAK GROWTH '74- 84	10,187
AVE. SYSTEM PEAK 1983 (TEST YEAR)	61,125
GROWTH AS PERCENT OF '83 PEAK	16.67%
TEST YEAR NON-COINCIDENT PEAK - PRIMARY	125,191
EST. GROWTH '74-'84	20,864
TEST YEAR NON-COINCIDENT PEAK - SECONDARY	85,985
EST. GROWTH '74-'84	14,330

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
DISTRIBUTION ADDITIONS/RETIREMENTS

WORKPAPER A-33

A. COST DATA

ADDITIONS

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
360	0	0	0	0	0	0	0	0	0	1,868	0
360.1	0	0	0	0	0	0	0	0	0	8,800	33,293
361	0	0	0	0	0	0	0	0	0	95,163	12,466
362	9,228	131,953	744	7,807	57,604	7,096	106,485	11,557	224	195,197	105,715
364	143,257	159,063	114,634	104,478	85,250	43,589	168,152	100,918	152,799	195,497	85,917
365	149,725	295,065	228,510	141,048	126,739	70,687	162,733	116,229	233,226	(6,630)	0
366	77,733	30,393	7,994	6,351	44,605	20,700	8,016	4,848	1,688	27,660	36,030
367	64,515	25,176	45,952	37,274	41,242	35,371	63,711	2,251	12,343	163,200	173,619
368	93,461	117,943	115,913	150,649	220,708	31,416	107,705	41,402	80,187		

RETIREMENTS

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
360	0	0	0	0	562	0	0	0	0	0	0
360.1	0	0	0	0	0	0	0	0	0	3,382	0
361	0	0	0	0	0	0	0	0	0	7,614	50,319
362	2,000	300	546	0	33,529	253	24,336	4,817	150	15,907	12,876
364	2,461	17,547	19,927	7,077	16,507	19,897	13,359	14,138	8,583	6,247	11,342
365	4,504	13,659	17,615	2,834	4,450	13,233	5,402	7,689	20,090	2,168	723
366	135	0	34	0	0	0	719	0	0	1,573	2,519
367	1,707	1,394	3,279	831	701	2,062	517	0	0	66,609	55,473
368	16,262	27,689	10,959	15,489	26,700	50,996	46,192	3,472	2,453		

B. DISTRIBUTION PRESENT WORTH FACTORS:

ADDITIONS

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
360	2.1321	1.7519	1.6377	1.5694	1.4868	1.3865	1.2626	1.1590	1.0711	1.0320	1.0000
360.1	2.1321	1.7519	1.6377	1.5694	1.4868	1.3865	1.2626	1.1590	1.0711	1.0320	1.0000
361	2.1321	1.7519	1.6377	1.5694	1.4868	1.3865	1.2626	1.1590	1.0711	1.0320	1.0000
362	2.1028	1.6667	1.5957	1.5517	1.4151	1.3235	1.2431	1.1338	1.0369	1.0000	1.0000
364	2.1284	1.6934	1.6454	1.6224	1.5364	1.4061	1.2541	1.1777	1.0691	1.0404	1.0000
365	2.3392	1.8692	1.5779	1.4639	1.4379	1.4294	1.3066	1.1571	1.1045	1.0519	1.0000
366	2.0481	1.8205	1.7317	1.6512	1.5214	1.4295	1.3067	1.2312	1.1330	1.0667	1.0000
367	1.9907	1.6797	1.6538	1.5809	1.4726	1.3871	1.0914	0.9908	1.0488	1.0236	1.0000
368	2.1100	1.7731	1.5985	1.5401	1.4067	1.3354	1.3188	1.2126	1.0498	1.0096	1.0000

RETIREMENTS

ACCT	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	AVE. LIFE
360	8.6923	8.6923	7.7931	6.6471	6.1081	5.7949	5.5122	5.1364	5.0222	4.7083	4.6122	30
360.1	8.6923	8.6923	7.7931	6.6471	6.1081	5.7949	5.5122	5.1364	5.0222	4.7083	4.6122	30
361	11.3000	11.3000	10.2727	10.2727	10.2727	9.8261	9.4167	9.0400	9.0400	8.6923	8.6923	39
362	8.0357	8.0357	7.7586	7.2581	7.2581	7.0313	6.8182	6.8182	6.8182	6.8182	7.0313	40
364	7.2500	7.0303	6.6286	6.4444	6.1053	5.9487	5.8000	5.2727	5.0435	4.9362	4.8333	25
365	11.5714	11.0455	11.0455	9.3462	8.1000	7.5938	7.5938	7.1471	6.5676	6.2308	6.0750	31
366	11.2105	12.5294	11.8333	11.8333	11.8333	12.5294	11.8333	11.8333	11.8333	12.5294	12.5294	53
367	9.3478	8.9583	8.9583	7.9630	7.6786	7.6786	7.6786	7.6786	6.5152	5.5128	4.6739	36
368	3.4032	3.6379	3.6379	3.6379	3.2462	2.6049	2.5119	2.4253	2.3187	2.0485	2.0485	32

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
CURRENT INVESTMENT COSTS - CUSTOMER EQUIPMENT

WORKPAPER A-4

A. INSTALLED COST OF METERING EQUIPMENT [1]

METER TYPES	STANDARD	1-PHASE	3-PHASE 200 AMP	3-PHASE 400 AMP	3-PHASE 1200+ AMP	PRIMARY METERING
1. MATERIALS COST	$32	$113	$308	$370	$680	$3,336
2. INSTALLATION COST	4	11	32	38	132	200
3. TOTAL	$36	$124	$340	$408	$812	$3,536

B. INSTALLED COST OF SERVICES [2]

	STANDARD	1-PHASE	3-PHASE 200 AMP	3-PHASE 400 AMP	3-PHASE 1200+ AMP	PRIMARY METERING
1. TOTAL INSTALLED COST	$191.58	$176.04	$318.75	$433.24	$433.24	$0.00

C. INSTALLED COST OF STREET LIGHTING

	MATERIALS [3]:	50W HPS	100W HPS	200W HPS	400W HPS	1000W HPS	100W MV	175W MV	400W MV	1000W MV
1.	FIXTURE	$60.00	$70.00	$96.88	$139.00	$231.25	$53.00	$58.00	$102.70	$176.00
2.	BULB	15.38	15.38	19.77	16.35	45.89	6.73	6.39	7.20	15.10
3.	BRACKET	23.00	23.00	23.00	54.06	54.06	23.00	23.00	54.06	54.06
4.	PHOTO	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
5.	TOTAL MATERIALS	$101.63	$111.63	$138.90	$212.86	$332.45	$85.98	$89.64	$167.21	$248.41
6.	OVERHEAD [4]	36.69	40.44	50.32	77.12	120.45	31.15	32.48	60.58	90.00
7.	TOTAL MATERIALS	$138.72	$152.07	$189.22	$289.98	$452.90	$117.13	$122.12	$227.79	$338.41
	LABOR (INSTALLATION) [5]:									
8.	INSTALLATION COST	$84.17	$84.17	$84.17	$84.17	$93.53	$84.17	$84.17	$84.17	$93.53
11.	TOTAL INVESTMENT	$222.89	$236.24	$273.39	$374.15	$546.43	$201.30	$206.29	$311.96	$431.94

NOTES:

[1] DATA PROVIDED BY ENGINEERING PERSONNEL. SEE RESPONSE AG6-1.
[2] DATA PROVIDED BY ENGINEERING PERSONNEL. SEE ATTACHMENT A-4A. OVERHEAD/UNDERGROUND COSTS WEIGHTED 85/15 TO REFLECT 1983 AND 1984 ACTUAL EXPERIENCE.
[3] DATA PROVIDED BY PURCHASING RECORDS.
[4] STOREROOM OVERHEAD EQUAL TO : 36.23%
[5] DATA PROVIDED BY ENGINEERING PERSONNEL. SEE ATTACHMENT A-4B.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
HANDY WHITMAN INDEX DATA

WORKPAPER A-5

	ACCT TIPL	ACCT 353	ACCT 354	ACCT 355	ACCT 356	ACCT 357	ACCT 358	ACCT IDPL	ACCT 362	ACCT 364	ACCT 365	ACCT 366	ACCT 367	ACCT 368
1910							12							
1911							12							
1912	11	15	8	6	15	6	12	11	15	6	12	8	12	42
1913	11	15	8	6	14	7	11	11	15	6	11	8	11	42
1914	10	15	8	6	13	7	10	11	16	6	10	8	11	42
1915	11	15	8	6	13	7	11	11	16	6	11	8	11	42
1916	13	17	11	7	31	8	16	13	17	7	17	9	16	42
1917	16	20	15	8	23	10	18	15	20	9	19	12	19	45
1918	19	25	16	12	27	14	21	19	25	10	22	16	22	61
1919	20	27	16	14	28	16	22	20	27	11	23	18	23	64
1920	22	30	16	15	29	17	23	22	30	13	23	20	24	68
1921	21	30	16	13	21	16	18	21	30	14	17	19	19	70
1922	20	28	15	12	20	15	18	20	28	13	16	17	19	62
1923	20	28	15	13	21	16	21	20	28	13	17	18	22	60
1924	20	29	16	13	21	16	20	20	29	14	17	18	21	62
1925	20	29	16	13	22	15	20	20	29	14	18	18	21	61
1926	20	30	16	13	22	15	20	20	28	14	17	17	21	57
1927	20	29	16	12	21	15	19	20	27	13	17	18	20	53
1928	20	29	16	12	23	15	21	20	26	13	18	18	22	52
1929	22	31	16	12	25	15	23	21	27	13	20	18	24	56
1930	20	30	16	12	21	15	19	20	27	14	17	17	20	55
1931	20	29	16	12	19	15	19	20	27	13	16	17	20	53
1932	19	28	14	11	17	13	18	19	26	12	14	16	18	51
1933	19	29	14	10	18	11	19	19	26	12	15	13	20	53
1934	20	32	15	12	21	14	20	20	28	13	17	16	21	54
1935	21	32	15	12	21	15	20	20	28	13	17	17	21	55
1936	22	33	16	12	22	15	22	20	29	13	17	17	23	55
1937	23	35	17	14	23	16	24	22	31	15	19	18	25	59
1938	23	36	17	14	22	17	22	22	31	15	18	20	23	61
1939	23	36	17	15	22	17	23	22	32	15	18	20	24	61
1940	24	36	18	15	23	17	23	23	33	16	19	21	24	61
1941	25	37	19	16	24	18	26	24	33	17	19	21	27	63
1942	25	37	20	17	26	19	27	25	33	18	21	22	28	62
1943	25	37	20	18	27	19	27	25	33	19	21	23	28	58
1944	25	35	20	19	27	20	27	26	32	21	22	23	28	58
1945	26	35	21	22	28	21	27	26	34	22	22	23	28	58
1946	29	39	23	23	33	24	32	29	39	23	26	26	33	65
1947	34	46	27	28	38	27	37	34	44	28	30	29	39	81
1948	38	49	30	30	40	31	44	37	46	31	32	33	46	84
1949	39	52	32	31	40	32	47	39	48	32	32	34	50	87
1950	42	56	34	32	42	33	51	41	50	33	34	36	53	91
1951	46	63	36	35	46	35	62	44	55	35	37	38	65	103
1952	48	65	38	37	48	37	64	45	56	36	39	39	67	103
1953	50	68	40	39	50	38	63	48	59	38	40	40	67	109
1954	51	69	41	40	53	40	65	49	61	39	42	42	68	112
1955	53	70	42	41	56	41	68	50	62	40	45	43	71	112
1956	57	77	45	44	61	44	66	53	68	44	49	46	70	115
1957	58	81	48	47	65	47	58	54	72	46	49	48	61	121
1958	60	84	50	48	64	49	58	56	74	47	48	50	61	118
1959	60	83	52	49	62	50	60	56	74	48	50	52	63	114
1960	60	77	53	51	63	51	61	57	72	50	51	54	64	112
1961	58	69	54	51	63	53	60	57	67	50	51	55	63	108
1962	58	68	56	53	64	55	60	58	68	52	53	57	63	98
1963	58	64	57	54	59	56	61	58	66	53	54	58	64	93
1964	61	68	59	55	63	58	65	60	68	54	56	60	69	93
1965	64	72	62	57	66	60	71	62	70	57	59	61	75	95
1966	66	74	65	60	69	62	72	64	71	59	61	62	76	95
1967	70	78	68	62	71	64	74	67	76	61	65	64	78	98
1968	72	80	71	64	71	67	71	70	81	63	68	66	74	103
1969	76	83	77	69	77	72	76	74	83	68	74	70	80	99
1970	82	87	82	74	88	79	80	81	87	74	85	78	85	100
1971	88	89	88	80	97	89	80	87	89	81	93	87	86	101
1972	92	92	94	86	98	96	90	92	92	87	96	94	97	99
1973	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1974	107	108	104	110	103	103	115	106	107	109	103	104	108	100
1975	135	142	137	140	132	117	143	129	135	137	130	117	128	115
1976	144	151	137	140	159	126	135	138	141	141	154	123	130	132
1977	149	153	142	143	172	133	134	144	145	143	166	129	136	137
1978	157	166	148	148	174	145	146	152	159	151	169	140	146	150
1979	166	179	166	161	169	154	152	163	170	165	170	149	155	158
1980	185	194	186	177	191	169	195	179	181	185	186	163	197	160
1981	203	208	201	190	223	179	234	195	195	197	210	173	217	174
1982	217	229	205	210	222	199	243	211	217	217	220	188	205	201
1983	225	234	213	223	234	211	244	219	225	223	231	196	210	209
1984	228	234	221	228	238	218	255	226	225	232	243	213	215	211

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
TRANSMISSION AND DISTRIBUTION O&M ADDERS

WORKPAPER B-1

A. HISTORY OF O&M EXPENSES	1983	1982	1981	1980	1979	AVERA
1. TRANSMISSION (EXCLUD TRANS BY OTHER	122,686	76,841	50,275	203,271	118,687	
2. DIST. 581-582 - STATION	27,838	27,395	25,520	18,320	13,430	
3. DIST. 583 - OVERHEAD	16,296	21,911	21,816	14,417	5,384	
4. DIST. 584 - UNDERGROUND	18,317	4,218	3,077	5,802	770	
5. DIST. 585,587 - LIGHTING	32,401	31,884	33,793	28,175	33,133	
6. DIST. 585 - METERS	85,510	85,698	83,747	84,419	83,634	
7. DIST. 580,588,589 - MISC.	285,347	199,697	211,251	172,635	153,708	
8. DIST. 591-592 - STATION	46,153	62,655	57,748	63,398	88,553	
9. DIST. 593 - OVERHEAD	375,039	329,390	386,360	330,644	274,302	
10. DIST. 594 - UNDERGROUND	25,015	32,609	23,940	9,596	27,181	
11. DIST. 595 - TRANS.	17,935	8,376	4,689	9,601	1,270	
12. DIST. 596 - LIGHTING	46,281	30,650	37,753	34,821	34,676	
13. DIST. 597 - METERS	1,492	762	3,908	150	1,678	
14. DIST. 590,598 - MISC.	10,933	9,940	11,111	12,176	17,430	

B. SUBTOTALS WITH SHARES OF MISC.						
1. TRANSMISSION	122,686	76,841	50,275	203,271	118,687	
2. DISTRIBUTION ACCTS 360-362	119,019	123,364	116,614	104,367	120,732	
3. DISTRIBUTION ACCTS 364-367	497,971	426,371	475,366	392,798	326,863	
4. LINE TRANSFORMERS	18,318	8,555	4,790	9,862	1,322	

C. DEVELOPMENT OF GROWTH ADJUSTED ANNUAL COST $1984 [1]						
ANNUAL CONSUMER PRICE INDEX	298.0	289.1	272.4	246.8	217.4	
ANNUAL SYSTEM AVE. MO. PEAKS	61,125	61,483	64,333	65,545	67,808	
AVE. NUMBER OF CUSTOMERS	19722	19458	19292	19062	18682	
1. TRANSMISSION	126,463	81,169	53,866	235,936	151,171	$129,
2. DISTRIBUTION ACCTS 360-362	122,683	130,312	124,943	121,138	153,776	$130,
3. DISTRIBUTION ACCTS 364-367	513,302	450,386	509,317	455,919	416,323	$469,
4. LINE TRANSFORMERS	18,882	9,037	5,132	11,447	1,684	$9,

D. ANNUAL COSTS PER UNIT	UNITS	AVE. $	UNIT COST
1. TRANSMISSION	55,626 KW CP DEMAND	$129,721	$2.33 /KW CP
2. DISTRIBUTION ACCTS 360-362	55,626 KW CP DEMAND	$130,570	$2.35 /KW CP
3. DISTRIBUTION ACCTS 364-367 P	85,985 KW NCP PRI	$234,525	$2.73 /KW NCP
4. DISTRIBUTION ACCTS 364-367 S	125,191 KW NCP SEC	$234,525	$1.87 /KW NCP-S
5. LINE TRANSFORMERS	125,191 KW NCP SEC	$9,236	$0.07 /KW NCP-S

NOTE: [1] GROWTH ADJUSTMENT TIED TO RELATIVE SYSTEM PEAKS (#CUST FOR METERS, SL, CUST EX.).
COSTS INFLATED USING THE CPI. INFLATION FOR 83-84 ASSUMED AT 82-83 RATE.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
CUSTOMER RELATED EXPENSES

WORKPAPER B-2

A. METERS	1983	1982	1981	1980	1979
1. ANNUAL COST WITH SHARE OF MISC.	$222,317	$186,494	$193,076	$181,003	$179,661
2. GROWTH ADJUSTED ANNUAL COST [1]	229,162	200,842	222,577	233,081	267,982
3. FIVE-YEAR AVERAGE	$230,729				

	STANDARD	1-PHASE	3-PHASE 200 AMP	3-PHASE 400 AMP	3-PHASE 1200+ AMP	PRIMARY METERING
4. ANNUAL CARRYING CHARGES	$7	$25	$67	$121	$161	$760
5. NUMBER OF METERS BY TYPE	19,822	1,134	299	299	139	18
6. TOTAL CARRYING CHARGES	$141,439	$29,346	$20,116	$35,972	$22,028	$13,680

7. O&M COSTS PER DOLLAR OF CARRYING CHARGES $0.85

B. STREET LIGHTING	1983	1982	1981	1980	1979
1. EXPENSE EXCLUDING REPLACEMENTS [2]	$83,662	$69,096	$76,298	$60,359	$70,484
2. GROWTH ADJUSTED ANNUAL COST [1]	86,238	74,411	87,955	77,725	105,134
3. FIVE-YEAR AVERAGE		$86,293			
4. NUMBER OF LAMPS IN SERVICE		5,000			
5. COST PER LAMP EXCLUDING REPLACEMENTS		$17.26			

	50W HPS	100W HPS	200W HPS	400W HPS	1000W HPS	100W MV	175W MV	400W MV	1000W MV
6. REPLACEMENT COST	$28.96	$28.93	$27.80	$31.05	$64.16	$16.12	$17.93	$18.51	$25.00
7. AVE. BULB LIFETIME	6	6	6	6	6	6	6	6	6
8. ANNUAL REPL. COST	$4.83	$4.82	$4.63	$5.18	$10.69	$2.69	$2.99	$3.09	$4.17
9. COST EXCL. REPL.	$17.26	$17.26	$17.26	$17.26	$17.26	$17.26	$17.26	$17.26	$17.26
10. TOTAL EXPENSE	$22.09	$22.08	$21.89	$22.43	$27.95	$19.95	$20.25	$20.34	$21.43

C. OTHER CUSTOMER COSTS	1983	1982	1981	1980	1979
1. CUSTOMER ACCOUNTING	879,896	797,870	837,661	699,135	732,562
2. CUSTOMER SERVICE AND SALES	83,162	99,928	117,826	56,393	55,817
3. GROWTH ADJ. CUST. ACCOUNTS [1]	906,984	859,253	965,649	900,291	1,092,690
4. GROWTH ADJ. CUST. SERVICE [1]	85,722	107,616	136,829	72,618	83,257
5. FIVE-YEAR AVERAGE: CUST. ACCOUNTS		$944,373			
6. FIVE-YEAR AVERAGE: CUST. SERVICE		$97,008			
7. TOTAL		$1,041,982			
8. NUMBER OF CUSTOMERS		22,977			
9. CUST. ACCOUNTS AND SERVICE COSTS PER CUSTOMER		$45.35			

NOTES:

[1] COSTS ADJUSTED TO 1984$ USING THE CPI AND ANNUAL NUMBER OF CUSTOMERS. SEE WORKPAPER B-1.
[2] COST ESTIMATES PROVIDED BY ENGINEERING PERSONNEL. SEE ATTACHMENT B-2.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
DEVELOPMENT OF GENERAL PLANT LOADER

WORPAPER C-1

	1983	1982	1981	1980	1979
A. PLANT IN SERVICE					
1. PRODUCTION	$7,548,043	$7,561,772	$7,613,017	$7,625,602	$7,565,104
2. TRANSMISSION	$7,526,868	$7,405,448	$7,329,819	$7,336,063	$7,398,611
3. DISTRIBUTION (ACCTS 360-368)	$12,277,615	$11,700,002	$11,251,411	$11,782,416	$11,272,090
4. CUSTOMER DISTRIBUTION (369,370)	$2,390,619	$2,254,013	$2,128,917	$1,998,646	$1,958,994
5. STREET LIGHTING (ACCTS 371,373)	$1,210,666	$1,117,395	$1,025,112	$918,870	$860,499
6. SUBTOTAL	$30,953,811	$30,039,230	$29,348,276	$29,661,597	$29,055,298
7. GENERAL PLANT	$565,726	$594,812	$555,053	$596,972	$559,335
B. GENERAL PLANT LOADER					
8. GENERAL PLANT AS % OF SUBTOTAL	1.83%	1.98%	1.89%	2.01%	1.93%
9. FIVE-YEAR AVERAGE		1.93%			
10. WITH ADDER FOR WORKING CAPITAL (WORKPAPER C-4)		2.13%			

NOTE: DATA FROM FERC FORM 1.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
DEVELOPMENT OF A&G PLANT LOADERS

	1983	1982	1981	1980	1979
A. PLANT COMPONENTS OF A&G EXPENSE					
1. ACCOUNT 923	$246,787	$295,788	$337,421	$146,645	$200,320
2. ACCOUNT 924	$32,406	$33,708	$27,320	$47,667	$41,493
3. ACCOUNT 927	$0	$0	$0	$0	$0
4. ACCOUNT 928	$57,660	$23,857	$19,846	$39,710	$42,696
5. ACCOUNT 932	$54,392	$50,419	$58,395	$47,211	$42,387
6. TOTAL	$391,245	$403,772	$442,982	$281,233	$326,896
B. PLANT RELATED A&G EXPENSE ADDER					
7. TOTAL PLANT IN SERVICE	$31,519,537	$30,634,042	$29,903,329	$30,258,569	$29,614,633
8. PLANT RELATED A&G	$391,245	$403,772	$442,982	$281,233	$326,896
9. PLANT A&G AS A PERCENT OF PLANT	1.24%	1.32%	1.48%	0.93%	1.10%
10. FIVE-YEAR AVERAGE	1.21%				

NOTE: DATA FROM FERC FORM 1.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
WORKING CAPITAL FACTORS
BASED ON TEST YEAR COST OF SERVICE

WORKPAPER C-4

A. PRODUCTION:			
TOTAL M&S EXPENSE		$192,535	
M&S FUEL EXPENSE		192,536	
M&S MINUS FUEL		(1)	
TOTAL O&M EXPENSE	18,823,755		
O&M FUEL EXPENSE	5,028,010		
OTHER PROD. FUEL EXPENSE	126,968		
PURCH POWER EXPENSE	12,912,049		
O&M MINUS FUEL	756,708		
PRODUCTION O&M WORKING CAPITAL (45 DAYS)		93,303	
NET PRODUCTION PLANT		7,549,677	
PRODUCTION W.C. FACTOR			0.0124
B. TRANSMISSION:			
TOTAL M&S EXPENSE		$0	
TOTAL O&M EXPENSE	764,440		
TRANSMISSION WORKING CAPITAL (45 DAYS)		94,255	
NET TRANSMISSION PLANT		7,669,045	
TRANSMISSION W.C. FACTOR			0.0123
C. DISTRIBUTION:			
TOTAL M&S EXPENSE		$294,787	
TOTAL O&M EXPENSE	988,557		
DISTRIBUTION WORKING CAPITAL (45 DAYS)		416,676	
NET DISTRIBUTION PLANT		15,905,007	
DISTRIBUTION W.C. FACTOR			0.0262
D. GENERAL:			
TOTAL M&S		$98,904.00	
TOTAL A&G O&M	2,294,888		
GENERAL WORKING CAPITAL (45 DAYS)		98,904	
NET GENERAL PLANT		960,266	
ADDER TO G.P. LOADER			0.1030

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
LOADERS FOR MARGINAL ENERGY COST
BASED ON TEST YEAR COST OF SERVICE

A. WORKING CAPITAL AS A PERCENT OF FUEL EXPENSE

1. MATERIALS AND SUPPLIES:			
MATERIALS AND SUPPLIES - FUEL		$192,535	
TOTAL FUEL EXPENSE		$5,154,998	
M&S AS A PERCENT OF FUEL			3.73%
2. WORKING CASH ALLOWANCE FOR FUEL (45 DAYS)			12.33%
3. TOTAL FRACTION OF FUEL EXPENSE			16.06%

B. ANNUAL CARRYING COSTS

4. ANNUAL CARRYING CHARGE RATE:			
RATE OF RETURN	0.15570	0.15570	
INTEREST DEDUCTION	0.06376		
TAXABLE INCOME BASE	0.09194		
TAX RATE	0.48850		
TAX EFFECTED BASE (/1-RATE)	0.17975		
TAXES (RATExI.E.BASE)	0.08781	0.08781	
TOTAL CHARGES (RETURN + TAXES)		0.24351	
5. ANNUAL CHARGES AS PERCENT ADDER TO FUEL EXPENSE			3.91%

C. ADDER FOR TRANSMISSION EXPENSE

1. ON-PEAK (NEW HAVEN HARBOR)		
1983 EXPENSE (FERC FORM 1 P. 332)	$144,315	
1983 ENERGY TRANSMITTED KWH	113,211,100	
EXPENSE PER KWH		$0.00127
2. OFF-PEAK (BECO)		
1983 EXPENSE (FERC FORM 1 P. 332)	$322,453	
1983 ENERGY TRANSMITTED KWH	282,950,520	
EXPENSE PER KWH		$0.00114

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY — WORKPAPER D-1

DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN GENERATION
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30	YR35
1. NET PLANT INVESTMENT	$100.00	$86.68	$70.02	$53.37	$36.71	$20.06	$3.40	$0.00
2. (-) TAX RESERVE	$0.00	($9.12)	($16.62)	($23.14)	($17.93)	($9.80)	($1.66)	($.00)
3. (+) WORKING CAPITAL(1)	$1.24	$1.07	$0.87	$0.66	$0.45	$0.25	$0.04	$0.00
4. TOTAL RATE BASE	$101.24	$78.62	$54.27	$30.89	$19.23	$10.51	$1.78	($.00)
5. RETURN ON RATE BASE (2)	$15.76	$12.24	$8.45	$4.81	$2.99	$1.64	$0.28	($.00)
6. INCOME TAX (3)	$8.56	$6.57	$4.43	$2.38	$1.36	$0.59	($0.18)	($.00)
7. PROPERTY TAX (4)	$3.54	$3.07	$2.48	$1.89	$1.30	$0.71	$0.12	$0.00
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$3.33	$3.33	$3.33	$3.33	$3.33	$3.33	$3.33	$0.00
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30	35
10. ANNUAL REVENUE REQUIREMENT	$31.19	$25.21	$18.69	$12.41	$8.98	$6.27	$3.55	($.00)
11. ANNUAL PRESENT VALUE (8)	$29.01	$13.15	$4.73	$1.52	$0.53	$0.18	$0.05	($.00)
12. CUMULATIVE PV	$29.01	$102.16	$139.41	$152.19	$156.34	$157.82	$158.27	$158.28

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 158.28

LIFETIME OF INVESTMENT IN YEARS 30.02191

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 16.09 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 1.24%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 30.0 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 6.21%

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY — WORKPAPER D-2

DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN TRANSMISSION
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30	YR35	YR40
1. NET PLANT INVESTMENT	$100.00	$90.02	$77.55	$65.08	$52.61	$40.13	$27.66	$15.19	$2.72
2. (-) TAX RESERVE	$0.00	($10.76)	($20.30)	($28.86)	($25.70)	($19.61)	($13.51)	($7.42)	($1.33)
3. (+) WORKING CAPITAL(1)	$1.23	$1.11	$0.95	$0.80	$0.65	$0.49	$0.34	$0.19	$0.03
4. TOTAL RATE BASE	$101.23	$80.37	$58.21	$37.02	$27.55	$21.02	$14.49	$7.96	$1.42
5. RETURN ON RATE BASE (2)	$15.76	$12.51	$9.06	$5.76	$4.29	$3.27	$2.26	$1.24	$0.22
6. INCOME TAX (3)	$8.64	$6.81	$4.86	$3.00	$2.17	$1.60	$1.02	$0.45	($0.12)
7. PROPERTY TAX (4)	$3.54	$3.19	$2.75	$2.30	$1.86	$1.42	$0.98	$0.54	$0.10
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$2.49	$2.49	$2.49	$2.49	$2.49	$2.49	$2.49	$2.49	$2.49
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30	35	40
10. ANNUAL REVENUE REQUIREMENT	$30.44	$25.00	$19.16	$13.56	$10.82	$8.78	$6.75	$4.72	$2.69
11. ANNUAL PRESENT VALUE (8)	$28.31	$13.04	$4.85	$1.66	$0.64	$0.25	$0.09	$0.03	$0.01
12. CUMULATIVE PV	$28.31	$100.31	$137.83	$151.32	$156.09	$158.00	$158.73	$158.99	$159.08

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 159.08

LIFETIME OF INVESTMENT IN YEARS 40.08980

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 14.55 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 1.23%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 40.1 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 6.81%

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY WORKPAPER D-3

DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE

FOR A $100 INVESTMENT IN DISTRIBUTION ACCOUNTS 360-362

SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30	YR35	YR40
1. NET PLANT INVESTMENT	$100.00	$89.87	$77.20	$64.54	$51.87	$39.21	$26.54	$13.87	$1.21
2. (-) TAX RESERVE	$0.00	($10.68)	($20.13)	($28.60)	($25.34)	($19.15)	($12.96)	($6.78)	($0.59)
3. (+) WORKING CAPITAL(1)	$2.62	$2.35	$2.02	$1.69	$1.36	$1.03	$0.70	$0.36	$0.03
4. TOTAL RATE BASE	$102.62	$81.54	$59.10	$37.63	$27.89	$21.08	$14.27	$7.46	$0.65
5. RETURN ON RATE BASE (2)	$15.98	$12.70	$9.20	$5.86	$4.34	$3.28	$2.22	$1.16	$0.10
6. INCOME TAX (3)	$8.76	$6.91	$4.94	$3.05	$2.20	$1.60	$1.00	$0.40	($0.06)
7. PROPERTY TAX (4)	$3.54	$3.18	$2.73	$2.28	$1.84	$1.39	$0.94	$0.49	$0.04
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$2.53	$1.21
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30	35	40
10. ANNUAL REVENUE REQUIREMENT	$30.81	$25.32	$19.40	$13.73	$10.91	$8.80	$6.69	$4.59	$1.29
11. ANNUAL PRESENT VALUE (8)	$28.66	$13.20	$4.91	$1.68	$0.65	$0.25	$0.09	$0.03	$.00
12. CUMULATIVE PV	$28.66	$101.55	$139.54	$153.20	$158.01	$159.94	$160.67	$160.92	$161.00

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 161.00

LIFETIME OF INVESTMENT IN YEARS 39.47732

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 15.69 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 39.5 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 6.17%

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY WORKPAPER D-4
DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN DISTRIBUTION ACCTS 364-367 PRI
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30
1. NET PLANT INVESTMENT	$100.00	$86.15	$68.83	$51.51	$34.20	$16.88	$0.00
2. (-) TAX RESERVE	$0.00	($8.86)	($16.04)	($22.23)	($16.71)	($8.25)	$.00
3. (+) WORKING CAPITAL(1)	$2.62	$2.26	$1.80	$1.35	$0.90	$0.44	$0.00
4. TOTAL RATE BASE	$102.62	$79.54	$54.60	$30.63	$18.39	$9.08	$.00
5. RETURN ON RATE BASE (2)	$15.98	$12.38	$8.50	$4.77	$2.86	$1.41	$.00
6. INCOME TAX (3)	$8.66	$6.64	$4.45	$2.34	$1.27	$0.45	$.00
7. PROPERTY TAX (4)	$3.54	$3.05	$2.44	$1.82	$1.21	$0.60	$0.00
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$3.46	$3.46	$3.46	$3.46	$3.46	$3.46	$0.00
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30
10. ANNUAL REVENUE REQUIREMENT	$31.65	$25.54	$18.85	$12.40	$8.81	$5.92	$.00
11. ANNUAL PRESENT VALUE (8)	$29.44	$13.31	$4.77	$1.52	$0.52	$0.17	$.00
12. CUMULATIVE PV	$29.44	$103.58	$141.23	$154.07	$158.18	$159.60	$159.97

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 159.97

LIFETIME OF INVESTMENT IN YEARS 28.87419

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 14.62 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 28.9 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 7.59%

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY WORKPAPER D-5

DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE

FOR A $100 INVESTMENT IN DISTRIBUTION ACCTS 364-367 SEC

SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30
1. NET PLANT INVESTMENT	$100.00	$86.15	$68.83	$51.51	$34.20	$16.88	$0.00
2. (-) TAX RESERVE	$0.00	($8.86)	($16.04)	($22.23)	($16.71)	($8.25)	$.00
3. (+) WORKING CAPITAL(1)	$2.62	$2.26	$1.80	$1.35	$0.90	$0.44	$0.00
4. TOTAL RATE BASE	$102.62	$79.54	$54.60	$30.63	$18.39	$9.08	$.00
5. RETURN ON RATE BASE (2)	$15.98	$12.38	$8.50	$4.77	$2.86	$1.41	$.00
6. INCOME TAX (3)	$8.66	$6.64	$4.45	$2.34	$1.27	$0.45	$.00
7. PROPERTY TAX (4)	$3.54	$3.05	$2.44	$1.82	$1.21	$0.60	$0.00
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$3.46	$3.46	$3.46	$3.46	$3.46	$3.46	$0.00
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30
10. ANNUAL REVENUE REQUIREMENT	$31.65	$25.54	$18.85	$12.40	$8.81	$5.92	$.00
11. ANNUAL PRESENT VALUE (8)	$29.44	$13.31	$4.77	$1.52	$0.52	$0.17	$.00
12. CUMULATIVE PV	$29.44	$103.58	$141.23	$154.07	$158.18	$159.60	$159.97

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 159.97

LIFETIME OF INVESTMENT IN YEARS 28.87419

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 14.62 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 28.9 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 7.59%

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY — WORKPAPER D-6

DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN TRANSFORMERS
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30	YR35
1. NET PLANT INVESTMENT	$100.00	$86.80	$70.30	$53.80	$37.30	$20.80	$4.30	$0.00
2. (-) TAX RESERVE	$0.00	($9.18)	($16.76)	($23.35)	($18.22)	($10.16)	($2.10)	$.00
3. (+) WORKING CAPITAL(1)	$2.62	$2.27	$1.84	$1.41	$0.98	$0.54	$0.11	$0.00
4. TOTAL RATE BASE	$102.62	$79.89	$55.39	$31.86	$20.06	$11.18	$2.31	$.00
5. RETURN ON RATE BASE (2)	$15.98	$12.44	$8.62	$4.96	$3.12	$1.74	$0.36	$.00
6. INCOME TAX (3)	$8.68	$6.69	$4.53	$2.47	$1.43	$0.65	($0.13)	$.00
7. PROPERTY TAX (4)	$3.54	$3.07	$2.49	$1.90	$1.32	$0.74	$0.15	$0.00
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$3.30	$3.30	$3.30	$3.30	$3.30	$3.30	$3.30	$0.00
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30	35
10. ANNUAL REVENUE REQUIREMENT	$31.50	$25.50	$18.95	$12.63	$9.17	$6.43	$3.69	$.00
11. ANNUAL PRESENT VALUE (8)	$29.30	$13.29	$4.79	$1.55	$0.55	$0.19	$0.05	$.00
12. CUMULATIVE PV	$29.30	$103.23	$140.93	$153.92	$158.15	$159.66	$160.13	$160.14

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 160.14

LIFETIME OF INVESTMENT IN YEARS 30.30303

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 19.06 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 30.3 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 4.19%

WORKPAPER D-7

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN SERVICES
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25
1. NET PLANT INVESTMENT	$100.00	$82.67	$61.01	$39.36	$17.70	$0.00
2. (-) TAX RESERVE	$0.00	($7.17)	($12.22)	($16.29)	($8.65)	$.00
3. (+) WORKING CAPITAL(1)	$2.62	$2.17	$1.60	$1.03	$0.46	$0.00
4. TOTAL RATE BASE	$102.62	$77.67	$50.39	$24.09	$9.52	$.00
5. RETURN ON RATE BASE (2)	$15.98	$12.09	$7.85	$3.75	$1.48	$.00
6. INCOME TAX (3)	$8.58	$6.39	$3.99	$1.68	$0.40	$.00
7. PROPERTY TAX (4)	$3.54	$2.93	$2.16	$1.39	$0.63	$0.00
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$4.33	$4.33	$4.33	$4.33	$4.33	$0.00
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25
10. ANNUAL REVENUE REQUIREMENT	$32.43	$25.74	$18.33	$11.16	$6.84	$.00
11. ANNUAL PRESENT VALUE (8)	$30.16	$13.42	$4.64	$1.37	$0.41	$.00
12. CUMULATIVE PV	$30.16	$105.48	$142.80	$154.88	$158.33	$159.08

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 159.08

LIFETIME OF INVESTMENT IN YEARS 23.08562

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 15.74 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 23.1 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 7.56%

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY — WORKPAPER D-8

DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN METERING EQUIPMENT
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25	YR30
1. NET PLANT INVESTMENT	$100.00	$86.56	$69.75	$52.95	$36.15	$19.34	$2.54
2. (-) TAX RESERVE	$0.00	($9.07)	($16.49)	($22.94)	($17.66)	($9.45)	($1.24)
3. (+) WORKING CAPITAL(1)	$2.62	$2.27	$1.83	$1.39	$0.95	$0.51	$0.07
4. TOTAL RATE BASE	$102.62	$79.76	$55.09	$31.40	$19.44	$10.40	$1.37
5. RETURN ON RATE BASE (2)	$15.98	$12.42	$8.58	$4.89	$3.03	$1.62	$0.21
6. INCOME TAX (3)	$8.67	$6.67	$4.50	$2.42	$1.37	$0.58	($0.13)
7. PROPERTY TAX (4)	$3.54	$3.06	$2.47	$1.87	$1.28	$0.68	$0.09
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$3.36	$3.36	$3.36	$3.36	$3.36	$3.36	$2.54
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25	30
10. ANNUAL REVENUE REQUIREMENT	$31.55	$25.51	$18.91	$12.55	$9.04	$6.24	$2.71
11. ANNUAL PRESENT VALUE (8)	$29.35	$13.30	$4.78	$1.54	$0.54	$0.18	$0.04
12. CUMULATIVE PV	$29.35	$103.36	$141.04	$153.97	$158.16	$159.64	$160.08

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 160.08

LIFETIME OF INVESTMENT IN YEARS 29.75570

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 18.43 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 29.8 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 4.66%

WORKPAPER D-9

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
DETERMINATION OF A LEVELIZED CARRYING CHARGE RATE
FOR A $100 INVESTMENT IN STREET LIGHTING
SUMMARY OF CALCULATIONS:1984

	YR1	YR5	YR10	YR15	YR20	YR25
1. NET PLANT INVESTMENT	$100.00	$82.89	$61.51	$40.12	$18.74	$0.00
2. (-) TAX RESERVE	$0.00	($7.27)	($12.46)	($16.67)	($9.15)	$.00
3. (+) WORKING CAPITAL(1)	$2.62	$2.17	$1.61	$1.05	$0.49	$0.00
4. TOTAL RATE BASE	$102.62	$77.79	$50.66	$24.51	$10.08	$.00
5. RETURN ON RATE BASE (2)	$15.98	$12.11	$7.89	$3.82	$1.57	$.00
6. INCOME TAX (3)	$8.58	$6.40	$4.02	$1.72	$0.46	$.00
7. PROPERTY TAX (4)	$3.54	$2.93	$2.18	$1.42	$0.66	$0.00
8. A&G PLANT EXPENSE (5)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. BOOK DEPRECIATION (6)	$4.28	$4.28	$4.28	$4.28	$4.28	$0.00
NOTE: TAX DEPRECIATION (7)	$5	$7	$6	$6	$0	$0
NOTE: INDEX OF YEAR	1	5	10	15	20	25
10. ANNUAL REVENUE REQUIREMENT	$32.38	$25.73	$18.36	$11.24	$6.97	$.00
11. ANNUAL PRESENT VALUE (8)	$30.12	$13.41	$4.64	$1.38	$0.41	$.00
12. CUMULATIVE PV	$30.12	$105.36	$142.71	$154.83	$158.32	$159.13

TOTAL CUMULATIVE PRESENT VALUE OF THE REVENUE REQUIREMENT 159.13

LIFETIME OF INVESTMENT IN YEARS 23.38142

LEVELIZED FIRST YEAR CARRYING CHARGE (9) 15.94 %

NOTES:

(1) THE WORKING CAPITAL ALLOWANCE AS A PERCENT OF NET PLANT EQUALS 2.62%
(2) ALLOWED RETURN ON RATE BASE IS SET EQUAL TO 15.57%
(3) INCOME TAXES CALCULATED USING AN EFFECTIVE TAX RATE OF 48.85%
(4) PROPERTY TAXES AS A PERCENT OF NET PLANT EQUAL 3.54%
(5) ANNUAL A&G EXPENSE AS A PERCENT OF NET PLANT IS EQUAL TO 0.00%
(6) BOOK DEPRECIATION ASSUMES STRAIGHT-LINE RATE FOR 23.4 YEARS
(7) TAX DEPRECIATION ASSUMES 15-YEAR ACRS SCHEDULE
(8) REVENUE VALUES DISCOUNTED TO BEGINNING-OF-YEAR AT THE RATE OF RETURN
(9) BASED ON AN INTEREST RATE AT THE RATE OF RETURN AND AN ESCALATION RATE FOR INVESTMENT COST OF 7.33%

FITCHBURG GAS AND ELECTRIC COMPANY
MARGINAL COST STUDY
MARGINAL LOSS FACTORS

WORKPAPER E-1

A. DEVELOPMENT OF ADJUSTMENT FACTOR [1]

BASE CASE MWH LOSSES	LINE	CORE	COIL	TOTAL	CUMULATIVE TOTAL	BASE LOAD MWH	PERCENT LOSSES
1. LOSSES AT NEPEX LEVEL	9,509	0	0	9,509	9,509	406,426	2.34%
2. 69KV LINE LOSSES	2,284	0	0	2,284	11,793	406,426	2.90%
3. 69-13.8KV LINE LOSSES	791	1,107	835	2,733	14,526	406,426	3.57%
4. SUBSTATION LOSSES - PRIMARY	0	1,269	1,255	2,524	17,050	406,426	4.20%
5. PRIMARY CIRCUIT LOSSES	10,246	0	0	10,246	27,296	406,426	6.72%
6. SECONDARY CIRCUIT LOSSES	289	5,306	703	6,298	33,594	406,426	8.27%
7. TOTAL				33,594			

INCREMENTAL CASE MWH LOSSES	INCREMENTAL MW LOAD					INCREMENTAL MWH		RATIO [2]
1. LOSSES AT NEPEX LEVEL	1.10408	9,822	0	0	9,822	9,822	9,698	3.23%	1.3784
2. 69KV LINE LOSSES	1.06959	2,374	0	0	2,374	12,196	9,698	4.15%	1.4319
3. 69-13.8KV LINE LOSSES	1.06004	816	1,107	890	2,813	15,010	9,698	4.98%	1.3945
4. SUBSTATION LOSSES - PRIMARY	1.05167	0	1,269	1,309	2,578	17,587	9,698	5.54%	1.3205
5. PRIMARY CIRCUIT LOSSES	1.04613	10,678	0	0	10,678	28,265	9,698	9.99%	1.4678
6. SECONDARY CIRCUIT LOSSES	1.00379	301	5,306	732	6,338	34,604	9,698	10.41%	1.2592
7. TOTAL	1.00000				34,604				

B. APPLICATION OF ADJUSTMENT FACTOR

	AVERAGE LOSS FACTORS					ESTIMATED MARGINAL LOSS FACTORS			
	DEMAND	ENERGY	ENERGY ON-PEAK	ENERGY OFF-PEAK	RATIO [2]	DEMAND	ENERGY	ENERGY ON-PEAK	ENERGY OFF-PEAK
1. LOSSES AT NEPOOL LEVEL	-	0.0234	0.0264	0.0198	1.3784	-	0.03226	0.03639	0.02729
2. LOSSES AT 69KV TRANSMISSION	-	0.02902	0.0302	0.0226	1.4319	-	0.04155	0.04324	0.03236
3. LOSSES AT 13.8 SUB-TRANS.	0.0637	0.03549	0.0315	0.0234	1.3945	0.08883	0.04949	0.04393	0.03263
4. LOSSES AT PRIMARY	0.0947	0.06708	0.0636	0.0528	1.4878	0.14089	0.09980	0.09462	0.07855
5. LOSSES AT SECONDARY	0.1208	0.08266	0.0776	0.0673	1.2592	0.15211	0.10409	0.09772	0.08475

NOTE: [1] BASE CASE MWH LOSSES AS PER COMPANY 1981 LOSS STUDY. INFORMATION RESPONSE AG 2-4 PAGE 2.
INCREMENTAL CASE BASED ON COMPANY METHODOLOGY SHOWN IN ATTACHMENT WP-E-1, BUT
WITH 1MW LOAD ADDITION LOSS-ADJUSTED.
[2] RATIO OF INCREMENTAL CASE LOSSES TO BASE CASE LOSSES.

FITCHBURG GAS AND ELECTRIC COMPANY
MARGINAL COST STUDY
RATING PERIODS BY TIME OF USE

A. RATING PERIODS DEFINED AS PER OF FILING:

ON-PEAK	9AM-9PM M-F ALL MONTHS
OFF-PEAK	ALL OTHER HOURS

B. ENERGY COSTS (MEASURED IN EACH PERIOD)	PERCENT OF COSTS BY PERIOD
ON-PEAK PERIOD	35.75%
OFF-PEAK PERIOD	64.25%

C. DEMAND COSTS

1. COINCIDENT PEAK (ALLOCATED ON AVERAGE MONTHLY SYSTEM PEAK)

ON-PEAK PERIOD	100.00%
OFF-PEAK PERIOD	0.00%

2. NON-COINCIDENT PEAK (ALLOCATED ON INDIVIDUAL MAXIMUM DEMANDS) [1]

ON-PEAK PERIOD	80.00%
OFF-PEAK PERIOD	20.00%

NOTES:

[1] A FRACTION OF NON-COINCIDENT PEAK DEMAND COSTS ARE ALLOCATED TO THE OFF PEAK PERIOD TO INDICATE THAT PEAK LOADING ON SOME DISTRIBUTION EQUIPMENT MAY OCCUR OUTSIDE OF THE PEAK PERIOD. THE COMPANY HAS NO DATA OR STUDIES TO INDICATE WHAT THAT FRACTION SHOULD BE, BUT CHOSE ONE-FIFTH (20%) AS A REASONABLE ESTIMATE.

FITCHBURG GAS AND ELECTRIC COMPANY
MARGINAL COST STUDY
DATA BY CLASS AND VOLTAGE LEVEL

WORKPAPER E-3

	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHTING
A. PERCENT OF DEMANDS BY VOLTAGE				
PERCENT AT PRIMARY VOLTAGE	0.00%	25.64%	95.99%	0.00%
PERCENT AT SECONDARY VOLTAGE	100.00%	74.36%	4.01%	100.00%
B. PERCENT OF CUSTOMERS BY VOLTAGE				
PERCENT AT PRIMARY VOLTAGE	0.00%	10.05%	94.44%	0.00%
PERCENT AT SECONDARY VOLTAGE	100.00%	89.95%	5.56%	100.00%

C. NUMBERS OF CUSTOMERS	TOTAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHTING
1. TOTAL CUSTOMERS	22,977	20,477	1,990	18	492
2. CUSTOMERS AT PRIMARY ONLY	87	0	72	15	0
3. CUSTOMERS AT SECONDARY ONLY	22,890	20,477	1,918	3	492
MULTIPLE BILLED RESIDENTIAL UNITS	655	655	0	0	0
D. CUSTOMER DEMANDS AT METER					
1. NON-COINCIDENT PEAK KW AT PRIMARY	125,191	57,872	34,468	31,981	870
2. NON-COINCIDENT PEAK KW AT SECONDARY	85,985	57,872	25,213	2,030	870
3. CLASS COINCIDENCE FACTOR		0.3292	0.6270	0.4564	0.4167
4. CLASS COINCIDENT PEAK KW AT METER	55,626	19,054	21,612	14,597	363
E. CONSUMPTION AT METER					
1. ANNUAL CONSUMPTION IN MWH	349,098	107,486	91,658	146,385	3,568

F. NUMBER OF METERS AND SERVICES BY TYPE

	RESID.	COMMERCIAL				INDUSTRIAL	
METER TYPES:	STNDRD	1-PHASE	3-PHASE 200 AMP	3-PHASE 400 AMP	3-PHASE 1200+ AMP	PRIMARY METERING	ST LIGH
COMMERCIAL WEIGHTING FACTOR		0.60	0.15	0.15	0.10		
NUMBER OF METERS AND SERVICES	19,822	1,194	299	299	199	18	

NOTES: DATA AS FILED.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY — WORKPAPER E-4
MARGINAL COST STUDY
LEVELIZED CARRING CHARGES AND ESCALATION RATES

A. LEVELIZED CARRING CHARGE MODEL INPUT DATA AND RESULT

INVESTMENT TYPE		GENERATION	TRANSMISSION	DISTRIBUTION ACC 360-362	DISTRIBUTION 364-367 PRI	DISTRIBUTION 364-367 SEC	TRANSFORMERS	SERVICES	METERING	STREET LIGHTING
ALLOWED RATE OF RETURN	[1]	0.155700	0.155700	0.155700	0.155700	0.155700	0.155700	0.155700	0.155700	0.155700
INTEREST COMPONENT	[1]	0.063757	0.063757	0.063757	0.063757	0.063757	0.063757	0.063757	0.063757	0.063757
WORKING CAPITAL FACTOR	[2]	0.012359	0.012290	0.026198	0.026198	0.026198	0.026198	0.026198	0.026198	0.026198
EFFECTIVE INC. TAX RATE	[1]	0.488500	0.488500	0.488500	0.488500	0.488500	0.488500	0.488500	0.488500	0.488500
ITC PERCENTAGE	[1]	0.100000	0.100000	0.100000	0.100000	0.100000	0.100000	0.100000	0.100000	0.100000
PROPERTY TAX RATE		0.035402	0.035402	0.035402	0.035402	0.035402	0.035402	0.035402	0.035402	0.035402
BOOK DEPRECIATION RATE		0.033309	0.024944	0.025331	0.034633	0.034633	0.033060	0.043317	0.033607	0.042769
ESCALATION FACTOR	[3]	0.062122	0.068145	0.061656	0.075683	0.075683	0.041815	0.075582	0.046624	0.073334
CARRYING CHARGE RATE	[4]	16.09%	14.55%	15.69%	14.62%	14.62%	19.06%	15.74%	18.43%	15.94%

B. PROPERTY TAX RATE

	83 PROP TAX	83 NET PLANT	FACTOR
PROPERTY TAX FACTOR:	789012	22287507	0.035402

C. BOOK DEPRECIATION RATE

BOOK LIFE:	30.0	40.1	39.5	28.9	28.9	30.3	23.1	29.8	23.4
83 DEP. EXPENSE	$251,876	$184,720	$65,096	$234,316	$234,316	$78,051	$41,535	$34,325	$47,789
82 YEAR END PLANT	$7,561,772	$7,405,448	$2,569,847	$6,765,609	$6,765,609	$2,365,146	$958,873	$1,021,366	$1,117,395

D. ESCALATION FACTORS BASED ON HANDY-WHITMAN INDEX

DATA:									
1984	237	228	225	237.5	237.5	211	219	204	261.5
1983	233	225	225	227	227	209	199	201	262.5
1979	173	166	170	167.5	167.5	158	150	143	194
1974	101	107	107	106	106	100	104	101	102.5
1969	88	76	83	71	71	99	70	89	77
1964	71	61	68	55	55	93	51	82	63.5
1954	49	51	61	40.5	40.5	112	39	74	52.5
1944	24	26	32	21.5	21.5	58	21	49	28.5

AVERAGE ESCALATION RATES FOR VARIOUS PERIODS:

1	1.01717	1.01333	1.00000	1.04626	1.04626	1.00957	1.10050	1.01493	0.99619
5	1.06498	1.06553	1.05766	1.07233	1.07233	1.03936	1.07863	1.07364	1.06153
10	1.08904	1.07859	1.07716	1.08402	1.08402	1.07753	1.07731	1.07283	1.09818
15	1.06828	1.07599	1.06874	1.08383	1.08383	1.05174	1.07900	1.06686	1.08492
20	1.06212	1.06815	1.06166	1.07588	1.07588	1.04181	1.07558	1.04662	1.07333
30	1.05395	1.05118	1.04447	1.06074	1.06074	1.02134	1.03920	1.03438	1.05498
40	1.05892	1.05578	1.04997	1.06189	1.06189	1.03281	1.06037	1.03630	1.05698

NOTES:
[1] FROM EXHIBIT PJS-5 REVISED 10/1/84.
[2] SEE WORKPAPER E-4.
[3] HANDY-WHITMAN ESCALATION FOR THE TWENTY YEAR PERIOD 1964-1984 HAS BEEN SELECTED AS MOST REPRESENTATIVE OF HISTORICAL, AND EXPECTED FUTURE ESCALATION RATES.
[4] SEE WORKPAPERS D-1 THROUGH D-9 FOR THE SUMMARY OF CALCULATIONS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY WORKPAPER E-5
MARGINAL COST STUDY
ESTIMATED FUEL REVENUE
BASED ON COSTS OF GAS AS PER FUEL FILINGS

1984	$/KWH	MWH
JAN	$0.04635	32,118
FEB	$0.05266	29,531
MAR	$0.05266	32,853
APR	$0.05266	30,392
MAY	$0.05140	29,740
JUN	$0.05140	30,982
JUL	$0.05140	29,361
AUG	$0.05373	33,869
SEP	$0.05373	32,002
OCT	$0.05373	32,368
NOV	$0.04960	31,897
DEC	$0.04960	34,624
WTD AVE	$0.05157	

FORM 0700-68

SHEET NO. ______
NAME OF COMPANY ______
SUBJECT ______
DATE 4/1/84
COMPUTED BY ______
CHECKED BY [illegible]

Electric Service

TYPE	Overhead $	Underground $
Residential		
Single Phase 120/240 V. 200 amp	143.48	464.17
Commercial / Industrial		
Single Phase 120/240 V. 200 amp	149.31	337.50
Three Phase 120/208 V. 200 amp	[illegible]	[illegible]
Three Phase 120/208 V 400 amp	133.88	433.00

Notes:

1. Average Service ... assumed 100' [illegible] ft in length
2. Costs [illegible] labor and material for services. Meters are not [illegible] in [illegible]
3. [illegible]

FORM 0700-68

SHEET NO.
NAME OF COMPANY
SUBJECT
DATE 11/1/11
COMPUTED BY
CHECKED BY

FORM 0700-68

SHEET NO.
NAME OF COMPANY
SUBJECT
DATE 4/1/92
COMPUTED BY
CHECKED BY

FORM 0700-68

ATTACHMENT A-4A page 4 of 5

SHEET NO.

NAME OF COMPANY

SUBJECT

DATE

COMPUTED BY

CHECKED BY

FORM 0700-68

SHEET NO.
NAME OF COMPANY
SUBJECT
DATE
COMPUTED BY
CHECKED BY

ATTACHMENT 2-1B

FORM 0700-63

Sheet No.
Name of Company
Subject
Date 11/1/84
Computed by
Checked by TWS

Outdoor Lighting
Labor

Flood Light

Set up .4
Mount Light .9
Service Conn .7

2.0 (1.4) = 2.8 Man Hours

2.8 (14.78) = 41.38

Fringes @ (.12) (41.38) = 46.35

Truck
2.8/2 = 1.4 (4.14) = 5.79

@ 52.14

Street Light

Set up .4
Mount Light .7
Service Conn .7

1.8 (1.4) = 2.52

2.52 (14.78) = 37.24

Fringes @ (.12) (37.24) = 41.72

Truck
2.52/2 (4.14) = 5.21

@ 46.93

63

FORM 0700-68

ATTACHMENT B-2 page 1 of 2

SHEET No. ____

NAME OF COMPANY ____

SUBJECT ____

DATE 4/1/[illegible]

COMPUTED BY ____

CHECKED BY [illegible]

Lamp Replacement [illegible]
Outdoor Lighting

Type	Labor & minimum	Material: Lamp	Stores Charge	Total
Flood Light	$	$	$	$
400 Watt Merc	9.20	7.05	2.26	18.51
400 Watt HPS	9.20	16.55	5.30	31.05
1000 Watt HPS	9.20	41.64	13.32	64.16
Street Light				
50 Watt HPS	9.20	14.97	4.79	28.96
100 Watt HPS	9.20	14.75	4.78	28.73
200 Watt HPS	9.20	14.09	4.51	27.80
400 Watt HPS	9.20	16.55	5.30	31.05
100 Watt Merc	9.20	5.24	1.68	16.12
175 Watt Merc	9.20	6.61	2.12	17.93
400 Watt Merc	9.20	7.05	2.26	18.51
100 Watt Merc [illegible]	9.20	5.24	1.68	16.12
175 Watt Merc [illegible]	9.20	6.61	2.12	17.93

1982

SCT [illegible] street light
87 [illegible] street light repair

FORM 0700-68

SHEET NO.

NAME OF COMPANY

SUBJECT

DATE 11/1/84

COMPUTED BY

CHECKED BY [illegible]

Equipment Replacement

Labor ½ hr @ 14.27/hr 7.13

Truck ½ hr @ 4.14 2.07

9.20

BASE CASE ON PEAK

(1.) 10/26/84 RDB

	LINE	CORE	COIL	TOTAL
69KV	2284MWH (.26MW×8784HRs)	—	—	2284.
69-13.8KV Δ	791MWH (.09MW×8784HRS)	1107MWH (63,000KVA × .002 MW/1000KVA)(HRS) → (.126MW)(8784HRs)	835MWH 45,000(.7173)²(.006 MW/1000KVA)(L.F.)(HRS) → (.13892MW)(.684)(8784HRS)	2733
69-13.8 SUB STA	—	1264MWH (72,250KVA × .002MW/1000KVA)(HRS) → (.1445MW × 8784HRs)	1255MWH 72,250(.6943)²(.006MW/1000KVA)(L.F.)(HRS) → (.20897MW)(.684)(8784HRS)	2524.
PRIM CKT	10,246 MWH [24,085MWH − (69KV+69 to 13.8KV)](PRIMARY Alloc. FACTOR) − 2524MWH → [24,085MWH − (2284+2783)](.6697) − 2524MWH → [19,068](.6697) − 2524 → [12,770] − 2524	—	—	10,24
SECONDARY	289MWH	5306MWH (129,002KVA × .004682 MW/1000KVA)(HRS) → (.604MW × 8784HRS)	703 MWH (129,002KVA)(.3889)²(.006MW/1000KVA)(L.F.)(HRS) → (.1171MW)(.684)(8784HRS)	6,2
	[24,085MWH − (69KV+69 to 13.8KV)](Secondary Alloc. FACTOR) − (5306+703) → [24,085MWH − 2284+2733)](.3303) − (6009) → [19,068](.3303) − (6009) → [6298] − (6009)			24,08

PRIMARY = .6697

SECONDARY = .3303

(2.) 10/26/84
RWB

MARGINAL LOSS STUDY = $LOAD_{BASE\ CASE}$ + 1 MW

1. CORE LOSSES ARE FIXED (DO NOT VARY WITH LOAD)

2. LINE & COIL LOSSES VARY with (LOADING)^2 as they are I^2R losses. eg. $\left[\frac{LOAD_{BASE} + 1\,MW}{LOAD\ BASE}\right]^2 (LOSSES_{BASE})$

LINE

A.) NEPEX

$$\left[\frac{67.68+1}{67.68}\right]^2 (9509.2\ MWH) = 9792\ MWH$$

B.) 69KV LINE LOSSES

$$\left[\frac{54.72+1}{54.72}\right]^2 (2284\ MWH) = 2368\ MWH$$

C.) 69-13.8 KV Δ LINE LOSSES

$$\left[\frac{67.68+1}{67.68}\right]^2 (791\ MWH) = 814\ MWH$$

D.) PRIMARY CIRCUIT

$$\left[\frac{50.166+1}{50.166}\right]^2 (10,246\ MWH) = 10,659\ MWH$$

E.) SECONDARY CIRCUIT

$$\left[\frac{50.166+1}{50.166}\right]^2 (289\ MWH) = 301\ MWH$$

COIL

IN ADDITION TO I^2R function, the ratio of LOAD to nameplate capacity must be taken into ACCOUNT.

A.) 69-13.8KV Δ

$$45{,}000KVA\left[\frac{32{,}280+1{,}000}{45{,}000}\right]^2 (.684\ L.F.)\left(.006\ \frac{KW}{KVA}\right)\frac{MW}{1000KVA}\ (8784\ HRS)$$

$$= 887\ MWH$$

lde

(3.) 10/26/84 dd3

1L (CONTINUED)

B.) 69-13.8 SUB STA

$$72{,}250\left[\frac{50{,}166+1000}{72{,}250}\right]^2\left(\frac{.006\ MW}{1000\ KVA}\right)(.684\ L.F.)(8784\ HRS)$$

$$= 1306\ MWH$$

C.) SECONDARY

$$129{,}002\left[\frac{50{,}166+1000}{129{,}002}\right]^2\left(\frac{.006\ MW}{1000\ KVA}\right)(.684\ L.F.)(8784\ HRS)$$

$$= 732\ MWH$$

CASE B
SCHEDULE 1

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
SUMMARY OF DEMAND COSTS

A. TOTAL DEMAND COST BY VOLTAGE LEVEL	GENERATION	SUB-TRAN	PRIMARY	SECONDARY
COINCIDENT PEAK RELATED COSTS:				
1. MARGINAL DEMAND LOSS FACTOR [1]		8.883%	14.089%	15.211%
2. GENERATION COST [2]	$37.50	$40.83	$42.78	$43.20
3. TRANSMISSION COST [3]	$22.42	$24.41	$25.58	$25.83
4. TOTAL DEMAND COST PER KW CP	$59.92	$65.24	$68.36	$69.03
NON-COINCIDENT PEAK RELATED COSTS:				
5. DISTRIBUTION COST [4]	$0.00	$0.00	$16.17	$44.01
6. TOTAL DEMAND COST PER KW NCP	$0.00	$0.00	$16.17	$44.01

B. TOTAL DEMAND COST BY TIME PERIOD [5]		GENERATION	SUB-TRAN	PRIMARY	SECONDARY
1. CP DEMANDS ON PEAK	100%	$59.92	$65.24	$68.36	$69.03
OFF PEAK	0%	$0.00	$0.00	$0.00	$0.00
2. NCP DEMANDS ON PEAK	80%	$0.00	$0.00	$12.93	$35.21
OFF PEAK	20%	$0.00	$0.00	$3.23	$8.80

C. TOTAL DEMAND COST BY CLASS [6]:	RES	GS1	GS2	OL
PERCENT AT PRIMARY VOLTAGE	0.00%	25.64%	95.99%	0.00%
PERCENT AT SECONDARY VOLTAGE	100.00%	74.36%	4.01%	100.00%
1. COINCIDENT DEMAND COST PER KW CP	$69.03	$68.86	$68.39	$69.03
2. CLASS COINCIDENCE FACTOR	0.1814	0.6331	0.5198	0.4167
3. CP DEMAND COST ADJUSTED TO NCP DEMANDS	$12.52.	$43.60	$35.55	$28.77
4. DEMAND COST PER KW NCP	$44.01	$36.87	$17.28	$44.01
5. TOTAL DEMAND COSTS PER KW NCP	$56.54	$80.47	$52.83	$72.78

NOTES:

[1] SEE WORKPAPER E-1. LOSSES APPLY TO CP COSTS ONLY, E.G. GENERATION AND TRANSMISSION.
[2] SEE SCHEDULE 1A
[3] SEE SCHEDULE 1B
[4] SEE SCHEDULE 1C
[5] SEE WORKPAPER E-2. COSTS BY TIME PERIOD ARE NOT USED FOR CALCULATING COSTS BY CLASS DUE TO THE LACK OF CLA
[6] SEE WORKPAPER E-3 FOR DATA ON CLASS DEMANDS BY VOLTAGE LEVEL AND CLASS COINCIDENCE FACTORS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
MARGINAL COSTS OF GENERATION

A. INVESTMENT COSTS

1. COST OF A PEAKER IN 1984 [1]		$320.02 /KW OF CAPACITY
2. INFLATE TO 1991 AT ESCALATION RATE [2] =	6.212%	487.98
3. DISCOUNT to 1984 AT RATE OF RETURN	15.57%	177.21
4. ADD 20% FOR RESERVE MARGIN	20.00%	35.44
5. NET INVESTMENT COST		$212.65 /KW ON SYSTEM PEAK
6. ADD LOADER FOR GENERAL PLANT [3]	2.13%	4.52
7. ADD LOADER FOR PLANT A&G [4]	1.21%	2.58
8. TOTAL INVESTMENT COST		$219.75 /KW OF SYSTEM PEAK

B. ANNUAL GENERATION COSTS

9. LEVELIZED CARRYING CHARGE RATE [5]	16.09%	
10. ANNUAL CARRYING CHARGES		$35.36
11. OPERATION AND MAINTENANCE EXPENSE [6]		$1.82
12. ADD NON-PLANT A&G [7]	17.70%	$0.32
13. TOTAL GENERATION CAPACITY COSTS		$37.50 /KW OF SYSTEM-PEAK [8]

NOTES:
[1] SEE WORKPAPER A-1.
[2] SEE WORKPAPER E-4. HANDY-WHITMAN ESCALATION FOR THE TWENTY YEAR PERIOD 1964-1984 HAS BEEN SELECTED AS THE MOST REPRESENTATIVE OF HISTORICAL, AND EXPECTED FUTURE ESCALATION RATES.
[3] SEE WORKPAPER C-1.
[4] SEE WORKPAPER C-2.
[5] SEE WORKPAPER D-1.
[6] SEE WORKPAPER A-1.
[7] SEE WORKPAPER C-3.
[8] SYSTEM PEAK DEMAND CAN BE DEFINED AS NEPOOL - DETERMINED CAPABILITY RESPONSIBILITY. CONTRIBUTION TO AVERAGE MONTHLY COINCIDENT PEAKS IS AN APPROPRIATE MEASURE OF CAPABILITY RESPONSIBILITY AND CAN THEREFORE BE USED TO ALLOCATE GENERATION CAPACITY COSTS.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
MARGINAL COSTS OF TRANSMISSION

A. INVESTMENT COSTS

1.	NET INCR. INVEST. '74-'84 ($1984) [1]		$1,395,180
2.	INCREASE IN AVE. MONTHLY PEAKS '74-'84 [2]		10,187
3.	NET INVESTMENT COST		$136.96 /KW BASED ON AVERAGE MONTHLY SYSTEM PEAKS
4.	ADD LOADER FOR GENERAL PLANT [3]	2.13%	$2.91
5.	ADD LOADER FOR PLANT A&G [4]	1.21%	1.66
6.	TOTAL INVESTMENT COST		$141.54 /KW AVE. MO. PEAK

B. ANNUAL TRANSMISSION COSTS

7.	LEVELIZED CARRYING CHARGE RATE [5]	14.55%	
6.	ANNUAL CARRYING CHARGES		19.93
7.	OPERATION AND MAINTENANCE EXPENSE [6]		2.33
8.	ADD NON-PLANT A&G [7]	7.08%	0.16
9.	TOTAL ANNUAL COSTS PER UNIT		$22.42 /KW AVE. MO. PEAK

NOTES:
[1] SEE WORKPAPER A-2
[2] SEE WORKPAPER A-2
[3] SEE WORKPAPER C-1
[4] SEE WORKPAPER C-2
[5] SEE WORKPAPER D-2
[6] SEE WORKPAPER B-1
[7] SEE WORKPAPER C-3

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
MARGINAL COST OF DISTRIBUTION

A. INVESTMENT COSTS [1]

	ACCOUNTS 360-362	ACCOUNTS 364-365 PRIMARY	ACCOUNTS 364-365 SECONDARY	ACCOUNTS 366-367 PRIMARY	ACCOUNTS 366-367 SECONDARY	ACCOUNT 368
1. INCR. INVEST. '74- 84 [2]	($300,098)	$1,429,189	$1,429,189	$381,867	$381,867	$942,916
2. INCREASE IN PEAKS '74-'84 [3]	10,187	26,770	20,236	26,770	20,236	20,236
3. NET INVESTMENT COST/KW NCP	($29.46)	$53.39	$70.63	$14.26	$18.87	$46.60
4. ADD LOADER FOR GEN PLANT [4]	(0.63)	1.13	1.50	0.30	0.40	0.99
5. ADD LOADER FOR PLANT A&G [5]	(0.36)	0.65	0.86	0.17	0.23	0.57
6. TOTAL INVESTMENT COST	($30.44)	$55.17	$72.99	$14.74	$19.50	$48.15

B. ANNUAL DISTRIBUTION COSTS

7. LEVELIZED C. CHG RATE [6]	15.69%	14.62%	14.62%	14.62%	14.62%	19.06%
8. ANNUAL CARRYING CHARGES	($4.78)	$8.07	$10.67	$2.16	$2.85	$9.18
9. OPER. AND MAINT. EXPENSE [7]	$2.34	$1.93	$1.46	$1.93	$1.46	$0.06
10. ADD NON-PLANT A&G [8]	1.71	1.41	1.06	1.41	1.06	0.04
11. TOTAL ANNUAL COSTS/KW NCP	($0.73)	$11.40	$13.19	$5.49	$5.37	$9.28

NOTES:

[1] PRIMARY DISTRIBUTION INCLUDES ACCOUNT 360-362.AND PRIMARY PORTIONS OF ACCOUNT 364-365, AND ACCOUNTS 366-3
SECONDARY DISTRIBUTION INCLUDES SECONDARY PORTIONS OF ACCOUNTS 364-365, AND ACCOUNTS 366-367, AND ACCOUNT
[2] SEE WORKPAPER A-3
[3] SEE WORKPAPER A-3
[4] SEE WORKPAPER C-1. SAME % LOADER AS FOR TRANSMISSION AND GENERATION.
[5] SEE WORKPAPER C-2. SAME % LOADER AS FOR TRANSMISSION AND GENERATION.
[6] SEE WORKPAPER D-3
[7] SEE WORKPAPER B-1
[8] SEE WORKPAPER C-3. THE FACTOR IS 72.80% OF O&M EXPENSE.

CASE B
SCHEDULE 2

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
SUMMARY OF ENERGY COSTS

A. MARGINAL ENERGY COSTS FROM 1984 QF FILINGS:	ON-PEAK	OFF-PEAK	TOTAL	MWH OUTPUT
JANUARY	0.05176	0.04014	0.04431	32,118
FEBRUARY	0.04975	0.04795	0.04860	29,531
MARCH	0.04975	0.04795	0.04860	32,853
APRIL	0.04975	0.04795	0.04860	30,392
MAY	0.05098	0.04500	0.04711	29,740
JUNE	0.05098	0.04500	0.04711	30,982
JULY	0.05098	0.04500	0.04711	29,361
AUGUST	0.05098	0.04428	0.04668	33,869
SEPTEMBER	0.05098	0.04428	0.04668	32,002
OCTOBER	0.05098	0.04428	0.04668	32,368
NOVEMBER	0.05010	0.03866	0.04273	31,097
DECEMBER	0.05010	0.03866	0.04273	34,624
ANNUAL AVERAGE WEIGHTED BY MWH	0.05059	0.04401	0.04636	

B. ADJUSTMENT FOR WORKING CAPITAL, TRANSMISSION AND LOSSES

1. WORKING CAPTIAL ADDER [1]	1.05%		
2. ADDER FOR TRANSMISSION EXPENSE [1]	$0.00127	ON-PEAK	$0.00114 OFF-PEAK
3. AVE. TRANS. EXPENSE (WTD BY ON/OFF HRS)	$0.00119	TOTAL PERIOD	

VOLTAGE:	PRIMARY	SECONDARY
1. ON-PEAK LOSSES [2]	0.09462	0.09772
2. OFF-PEAK LOSSES [2]	0.07855	0.08475
3. TOTAL LOSSES [2]	0.09980	0.10409
MARGINAL ENERGY COSTS PER KWH BY VOLTAGE: [3]		
4. ON-PEAK	$0.05736	$0.05752
5. OFF-PEAK	$0.04920	$0.04948
6. TOTAL	$0.05283	$0.05303

ANNUAL MARGINAL ENERGY COSTS BY CLASS: [4]	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHTING
PERCENT KWH AT PRIMARY	0.00%	10.05%	94.44%	0.00%
PERCENT KWH AT SECONDARY	100.00%	89.95%	5.56%	100.00%
7. CLASS CENTS/KWH	$0.05303	$0.05301	$0.05284	$0.05303

NOTES:
[1] FROM WORKPAPER C-5
[2] FROM WORKPAPER E-1
[3] AVERAGE WEIGHTED $/KWH ADJUSTED FOR WORKING CAPITAL, TRANSMISSION EXPENSE, AND LOSSES
[4] CLASS CONSUMPTION BY VOLTAGE LEVEL FROM WORKPAPER E-3

CASE B
SCHEDULE 3

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
SUMMARY OF CUSTOMER COSTS

A. METERS AND SERVICES		STANDARD	1-PHASE	3-PHASE 200 AMP	3-PHASE 400 AMP	3-PHASE 1200+ AMP	PRIMARY METERING
NUMBER [1]:	RESIDENTIAL	19,822					
	COMMERCIAL		1,194	299	299	199	
	INDUSTRIAL						18
1. ANNUAL COST FOR METERS [2]		$348,312	$72,268	$49,538	$88,586	$78,873	$33,703
2. ANNUAL COST FOR SERVICES [2]		641,633	35,514	16,076	21,851	14,567	0
3. TOTAL		$989,945	$107,782	$65,615	$110,437	$93,440	$33,703

	TOTAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHT
NUMBER OF CUSTOMERS [1]	22,977	20,477	1,990	18	492
4. TOTAL ANNUAL COST		$989,945	$377,273	$33,703	$0
5. TOTAL ANNUAL COST PER CUSTOMER		$48.34	$189.58	$1,872.39	$0

B. STREET LIGHTING	50W HPS	100W HPS	200W HPS	400W HPS	1000W HPS	100W MV	175W MV	400W MV	1000W MV
NUMBER BY TYPE [3]	1/90	474	274	225	42	1009	337	381	42
1. ANNUAL COST BY TYPE [4]	$66.54	$68.74	$74.66	$91.45	$119.83	$62.98	$63.60	$81.21	$100.97
2. TOTAL ANNUAL COST BY TYPE	$119,104	$32,582	$20,511	$20,577	$5,033	$63,548	$22,778	$30,940.98	$4,240.88
3. TOTAL ANNUAL COST	$319,314	EQUALS	$649.01	PER STREET LIGHTING CUSTOMER					

C. OTHER CUSTOMER EXPENSES	TOTAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	STREET LIGHT
NUMBER OF CUSTOMERS	22,977	20,477	1,990	18	492
1. COST PER CUSTOMER [4]		$45.35	$45.35	$45.35	$45.35

D. TOTAL CUSTOMER COSTS

1. TOTAL CUSTOMER COSTS/CUSTOMER	$93.69	$234.93	$1,917.74	$694.36

NOTES:
[1] SEE WORKPAPER E-3.
[2] SEE SCHEDULE 3A. $/UNIT VALUES MULTIPLIED BY NUMBER OF UNITS.
[3] FROM COMPANY BILLING RECORDS.
[4] SEE SCHEDULE 3-B.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
COSTS OF METERS AND SERVICES

SCHEDULE 3A

		STANDARD	1-PHASE	200 AMP	400 AMP	1200+ AMP	METERING
A. COST OF METERS							
1. NET INVESTMENT COST: METERS [1]		$36.00	$124.00	$340.00	$608.00	$812.00	$3,836.00
2. ADDER FOR GENERAL PLANT [2]	2.13%	0.77	2.64	7.23	12.93	17.26	81.55
3. ADDER FOR PLANT A&G [3]	1.21%	0.44	1.51	4.13	7.39	9.86	46.60
4. TOTAL INVESTMENT		$37.20	$128.14	$351.36	$628.31	$839.13	$3,964.15
5. CARRYING CHARGES [4]	19.18%	7.14	24.58	67.39	120.51	160.94	760.32
6. OPERATION AND MAINTENANCE [5]		$6.04	$20.80	$57.04	$102.00	$136.23	$643.57
7. ADDER FOR NON-PLANT A&G [6]	72.80%	4.40	15.14	41.53	74.26	99.17	468.50
8. TOTAL ANNUAL COSTS		$17.57	$60.53	$165.96	$296.77	$396.35	$1,872.39
B. COST OF SERVICES							
1. NET INVESTMENT COST: SERVICES [1]		$191.58	$176.04	$318.75	$435.24	$435.24	$0.00
2. ADDER FOR GENERAL PLANT [2]	2.13%	4.07	3.74	6.78	9.21	9.21	0.00
3. ADDER FOR PLANT A&G [3]	1.21%	2.33	2.14	3.87	5.26	5.26	0.00
4. TOTAL INVESTMENT		$197.98	$181.92	$329.40	$447.71	$447.71	$0.00
5. CARRYING CHARGES [7]	16.35%	$32.37	$29.74	$53.86	$73.20	$73.20	$0.00
6. OPERATION AND MAINTENANCE [5]		0.00	0.00	0.00	0.00	0.00	0.00
7. ADDER FOR NON-PLANT A&G [6]	72.80%	0.00	0.00	0.00	0.00	0.00	0.00
8. TOTAL ANNUAL COSTS		$32.37	$29.74	$53.86	$73.20	$73.20	$0.00

[1] SEE WORKPAPER A-4.
[2] SEE WORKPAPER C-1.
[3] SEE WORKPAPER C-2.
[4] SEE WORKPAPER D-7.
[5] SEE WORKPAPER B-2.
[6] SEE WORKPAPER C-3.
[7] SEE WORKPAPER D-8.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
STREET LIGHTING AND OTHER CUSTOMER COSTS

SCHEDULE 3B

A. COST OF STREET LIGHTING		50W HPS	100W HPS	200W HPS	400W HPS	1000W HPS	100W MV	175W MV	400W MV	1000W
1. NET INVESTMENT COST: STREET LIGHTS [1]		$222.89	$236.24	$273.39	$374.15	$546.43	$201.50	$206.29	$311.96	$431
2. ADDER FOR GENERAL PLANT [2]	2.13%	4.74	5.02	5.81	7.95	11.62	4.28	4.39	6.63	9
3. ADDER FOR PLANT A&G [3]	1.21%	2.71	2.87	3.32	4.55	6.64	2.45	2.51	3.79	5
4. TOTAL INVESTMENT		$230.34	$244.14	$282.53	$386.65	$564.68	$208.03	$213.18	$322.38	$446
5. CARRYING CHARGES [4]	15.94%	$36.72	$38.92	$45.03	$61.63	$90.01	$33.16	$33.98	$51.39	$71
6. OPERATION AND MAINTENANCE [5]		17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17
7. ADDER FOR NON-PLANT A&G [6]	72.80%	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12
8. TOTAL ANNUAL COSTS		$66.54	$68.74	$74.86	$91.45	$119.83	$62.98	$63.80	$81.21	$100

B. OTHER CUSTOMER COSTS

1. CUSTOMER SERVICE AND ACCOUNTS [7] $45.35 PER CUSTOMER

NOTES:
[1] SEE WORKPAPER A-4.
[2] SEE WORKPAPER C-1.
[3] SEE WORKPAPER C-2.
[4] SEE WORKPAPER D-9.
[5] SEE WORKPAPER B-2.
[6] SEE WORKPAPER C-3.
[7] SEE WORKPAPER B-2.

CASE B
SCHEDULE 4

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
1984 MARGINAL COST STUDY
MARGINAL COSTS UNCONSTRAINED

	TOTAL COMPANY	RESIDENTIAL CLASS RATES E-R,SC,I	COMMERCIAL CLASS RATE E-GS1,CI	INDUSTRIAL CLASS RATE E-GS2	OUTDOOR LIGHTING CLASS RATE E-OL
A. CUSTOMER INFORMATION					
NO. CUSTOMERS	22,977	20,477	1,990	18	492
ANNUAL KWH SALES	349,098,014	107,485,886	91,658,312	146,303,359	3,568,457
NON-COINC. KW - DEMAND	160,632	93,313	34,468	31,381	870
B. MARGINAL COST SUMMARY [1]					
1. DEMAND COSTS	$9,802,086	$5,275,467	$2,773,667	$1,689,634	$63,318
2. ENERGY COSTS	18,483,356	5,700,302	4,859,021	7,734,786	189,246
3. CUSTOMER COSTS	2,762,217	1,918,554	467,518	34,519	341,626
4. TOTAL	$31,047,658	$12,894,324	$8,100,205	$9,458,940	$594,190
C. COMPARISON WITH REVENUE REQUIREMENT					
1. TOTAL MARGINAL COSTS	$31,047,658	$12,894,324	$8,100,205	$9,458,940	$594,190
2. TOTAL BASE RATES REQUESTED [2	$22,414,431	$9,054,806	$6,864,966	$5,819,825	$674,834
3. FUEL RATE REVENUE 1984 [3]	18,002,346	5,542,851	4,726,652	7,548,825	184,019
4. TOTAL REVENUE REQUIREMENT	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
5. DIFFERENCE	($9,369,119)	($1,703,333)	($3,491,412)	($3,909,711)	($264,663)

NOTES:
[1] VALUES FROM SCHEDULES 1,2 AND 3 MULTIPLIED TIMES VALUES IN SECTION A.
[2] FROM EXHIBIT GRG-9.
[3] FUEL RATE REVENUE IS CALCULATED ON THE BASIS OF 1984 FILED FUEL COST RATES, IN ORDER TO BE CONSISTENT WITH THE METHOD FOR ESTIMATING MARGINAL ENERGY COST. THE RESULTING 1984 AVERAGE ANNUAL FUEL RATE, EXCLUDING OVER AND UNDER RECOVERIES, IS $0.05157 PER KILOWATT HOUR. SEE WORKPAPER E-5.

SCHEDULE 5

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY
MARGINAL COST STUDY
MARGINAL COSTS CONSTRAINED TO REVENUES

	TOTAL COMPANY	RESIDENTIAL CLASS RATES E-R,SC,I	COMMERCIAL CLASS RATE E-GS1,CT	INDUSTRIAL CLASS RATE E-GS2	OUTDOOR LIGHTING CLASS RATE E-OL
A. CUSTOMER INFORMATION					
NO. CUSTOMERS - PRIMARY	22977	20477	1990	18	492
ANNUAL KWH SALES	349,098,014	107,485,886	91,638,312	146,385,359	3,568,457
NON-COINC. KW - DEMAND	160,632	93,313	34,468	31,581	870
B. MARGINAL COST SUMMARY - CUSTOMER COSTS CONSTRAINED [1]					
1. DEMAND COSTS	9,802,086	5,275,467	2,773,667	1,689,634	63,318
2. ENERGY COSTS	18,483,356	5,700,302	4,859,021	7,734,786	189,246
3. CUSTOMER COSTS	12,131,336	3,621,887	3,958,930	3,944,230	606,289
4. TOTAL	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
C. COMPARISON WITH REVENUE REQUIREMENT					
1. TOTAL MARGINAL COSTS	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
2. TOTAL BASE RATES REQUESTED	$22,414,431	$9,054,806	$6,864,966	$5,819,825	$674,834
3. FUEL RATE REVENUE 1984	18,002,346	5,542,851	4,726,652	7,548,825	184,019
4. TOTAL REVENUE REQUIREMENT	$40,416,777	$14,597,657	$11,591,618	$13,368,650	$858,853
5. DIFFERENCE	$0	$0	$0	$0	$0

NOTE:
[1] THE DIFFERENCE BETWEEN MARGINAL COSTS AND REVENUE REQUIREMENT BY CLASS ON SCHEDULE 4 IS SUBTRACTED FROM CUSTOMER COSTS FOR EACH CLASS.